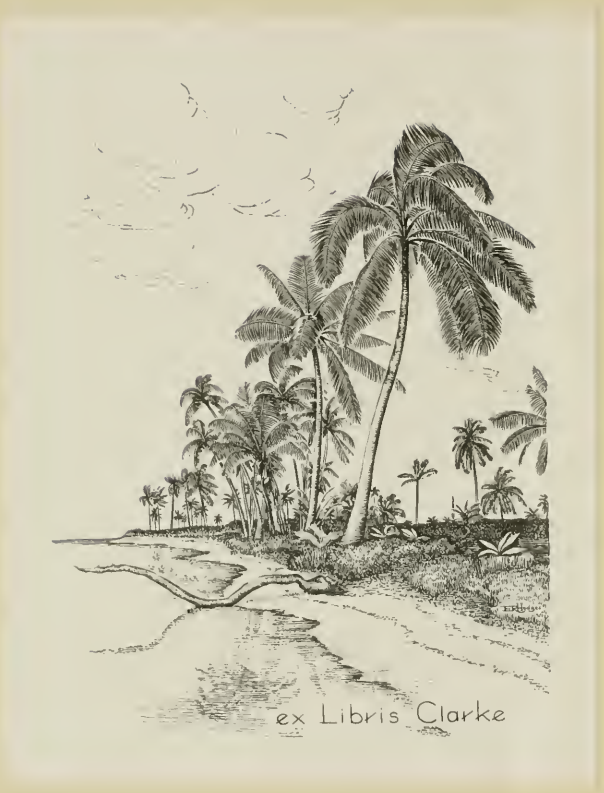
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Mrs. August Busch

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Notes on a Eriocranid Larva.

By W. D. Kearfott.

Our entomological literature is altogether barren of facts in regard to the larval habits or life history of any one of our American species of Micropterygidæ, in fact the perfect insect is a *rara-avis* and to be found in but few collections and in small numbers.

For this reason I wish to record the following preliminary account of the larva of at least one species. The only excuse for the publication of such incomplete data is the desire to inform fellow-workers of the discovery, so that they may make an effort to secure the larvæ and work out the life history during the coming spring and summer.

During early June or late May last year I found in several places about Montclair, N. J., the leaves of common chestnut *Castanea Americana*, with very large blotch mines, the mines often extended entirely across the end of a leaf, or on one side of the mid-rib for nearly half the length of the leaf. By holding the leaf up to the light a broad, flattened apodous-like larva could be seen eating industriously, and when disturbed wriggling quite vigorously. When feeding the larva sweeps circles of 10 mm. or more radius, the anal end acting as a pivot, and the outline of the mine is a series of these semi-circles. The frass is deposited in fine curved lines.

Leaf-mining lepidopterous larvæ are unusual so early in the spring. For this reason, and also that I felt reasonably sure that I had a leaf-mining Coleopter, I paid rather scant attention to these larvæ other than to place the leaves in a jelly glass with a little moss and earth at the bottom and a gauze cover over the top. I noticed that within a day or two all the larvæ came out of the mines and had burrowed beneath the earth. They were bare and not enclosed in a case made out of a small part of the leaf.

The matter was allowed to rest here for several months. In October, when field work required less attention, I had time to learn something of the contents of several new accessions to my library, which included Stainton's "Natural History of the Tineina" and the first two volumes of J. W. Tutts' elaborate work entitled "British Lepidoptera." On Plate 3, Vol. XIII, of Stainton's work are beautifully drawn figures of three Euro-

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pean species, showing moth, larva and mine, and as soon as I saw them I felt sure the identification of my chestnut miner was at hand. I got down my jelly glass and found a dozen or more small oval cocoons of rather tough texture and covered with particles of earth; upon opening some of these cocoons I found some of the larvæ had dried up and others had pupated and then dried up. Only one or two were alive; these I carefully put away, hoping to get the moth later, but at this writing all are dead, so it will be impossible to prove the species this year.

During the past few months I have been making a critical study of the pupæ of a number of Tortricidæ bred last year and sought the aid of Dr. Packard's first part of his "Monograph of the Bombycine Moths." On page 62 of this work is shown the pupa of European *Micropteryx purpurella*. It also looked familiar, and I placed under the microscope the pupa of one of my chestnut miners and the mystery was solved.

If Dr. Packard's drawing had been made from my pupa it could hardly have shown a more striking likeness. All the limbs and organs are free, and across the front, just below the eyes, are the enormous cutting mandibles, the labrum is cleft on the lower edge and bears eight setæ; on the epicranium are also four long setæ; all of these setæ are fully as long as half the width of the pupa. On the square clypeus are the curious filamentarious tentacles referred to by Packard.

I succeeded in softening up one of the dried larva and inflated it and give the following brief description: 5 to 6 mm. long, flattened; segments 5 to 7, broadest, tapering to a narrow point at anal extremity; head small, brown, somewhat like that of a *Nepticula*; no pro-thoracic shield, but a small brown anal shield; apodous.

I am at work on a detailed description of the pupa and larva and will make enlarged drawings of all details, but will defer publication until I can get fresh specimens to compare.

In Tutts' work, referred to above, Vol. I, p. 129 *et seq.*, is a most elaborate account of the European members of this group, citing the papers of Chapman and Waller, who have been the foremost investigators in this family. Mr. Tutt divides the group into two distinct and separate super-families: Micropterygidæ and the Eriocranidæ. The former includes the species whose larvæ feed on wet moss, and the latter those species

whose larvæ are leaf miners. Lord Walsingham has erected a new genus for two of the American species, *i. e.*, *Epimartyria* (*E. pardella* Wlsm., and *E. auricrinella* Wlsm.) and which genus in some respects Tutt considers more archaic than *Micropteryx*.

It is quite probable that my species is *Eriocrania griseo-capitella* Wlsm., as for several years I have taken a specimen of this late in April or very early in May, or it may be another species which is yet unidentified, of which I took one specimen in midsummer two years ago.

Now that we have the clue I hope our American species will be rapidly overhauled and their life histories fully known. I will add that about the same time I found the chestnut miners I found similar mines and larvæ on oak; these may be the same species; I did not take care of them and made no notes, thinking it impossible they could be anything else than Coleopterous.

A word about the perfect insects of these group may be of interest. My first specimen was taken just about at dusk April 21. It doubtless was resting on or near the ground. I caught it as it was flying upwards in an almost vertical line, flight quite slow and seemingly laborious. The second specimen (and I think a different species) was taken about 8.30 p. m. about the middle of July on the wire mosquito screen enclosing my piazza, attracted by a lamp which was within. The third specimen was taken May 4, about 11 a. m. It is the same species as the first and was disturbed from the ground or low down on a tree trunk. As a violent wind was blowing it was impossible to observe its natural flight and it was captured with difficulty. I saw a fourth specimen resting on the bole of a small beech tree about five feet from the ground; the morning sun, about 11 a. m., was shining on it, and it sparkled like an emerald from the light reflected from the exquisite metallic green of its wings. I attempted to place a small cyanide bottle over it, but before my hand was within a foot of it, it jumped like a leaf hopper and was out of sight in an instant. Numbers one and three were captured (and number four seen) in a rather open woods, principally hard and soft woods and a great abundance of shrubbery, on the Watchung Mountains, back of Montclair, at an elevation of five or six hundred feet above sea level.

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A REVISION OF THE NORTH AMERICAN SPECIES OF THE GENUS CHOREUTIS.

By W. D. KEARFOTT.

These exquisite little creatures with their wealth of silver and metallic scales have always been of more than ordinary interest to me, and when I had the good fortune to breed a long series last summer, the subsequent efforts to identify them aroused an additional interest in the literature on the subject, of which this paper is the result.

I took a number of my bred specimens to the National Museum and compared them with all of the North American and European species there but could find none that were the same as mine. I then forwarded a pair to Lord Walsingham and another pair to Mr. E. J. Meyrick. Their replies, which I quote below, indicated that my species might be new and also raised the question whether the true *bjerkandrella* Thunb., and its var. *pretiosana* Dup., which have so long been on our lists, really do occur in the United States.

The investigation of the latter question was considerably more than I had bargained for, and for a novice seemed like presumption so soon after the revision of this group by Dr. Dyar and Professor Fernald, in the Canadian Entomologist.

I was fortunately, however, in possession of a goodly number of specimens from widely separated parts of North America, and as a primary requisite I obtained from Drs. Staudinger and Bang-Hass long series of the European *bjerkandrella* and *pretiosana*, as well as all other available European species of this genus. I was rather alarmed to find that, while closely allied, none of the European forms compared

exactly with any I had from this country. I then borrowed from Dr. Dietz all of his specimens and again visited the National Museum and examined carefully all the specimens there (both North American and European). In the meantime Lord Walsingham kindly sent me a pair of *silphiella*, which he collected thirty years ago in California and Mr. Meyrick a specimen from New Zealand. Miss Murtfeldt also loaned me one of her Missouri bred specimens. Altogether I have had the opportunity for critical comparison of between 250 and 300 specimens.

Almost from the beginning I was convinced that we had a larger number of valid species than was indicated by the late synopses and this conviction was strengthened by the examination of each fresh lot of material, and what was most convincing was that the specimens could readily and easily be separated out into the specific groups I had arranged for them and moreover the species did not intergrade and I have seen no specimens that could doubtfully be referred to two or more species.

The only stumbling block was the separation of *pretiosana* from the nearest allied American form, as it certainly was but little less than sacrilege to attempt to root up and cast away so venerable a trespasser from our lists; in point of fact I have not a particle of doubt that in the, possibly not very remote, past *pretiosana* was common to North America, Eurasia, Australasia and possibly South America (I have an unidentified species allied to it from Brazil) but time and environment produce changes and I believe when a change becomes a fixture and invariable new species are evolved. In fact our science is based on evolution; we generally agree with Darwin that man's ancestor was monkey and while we can also agree that both have many characteristics in common it would be difficult to find one with the temerity to claim they were the same species or even that one is a variety of the other; and so, I have taken the stand that our American forms have all so far departed from the stem forms that we have separate and distinct species.

I have recognized twelve species and one variety and it is a nice question for the splitters and lumpers to decide whether there are ten varieties of *pretiosana* or whether they are all *pretiosana* or whether they are all good species. My conclusions point to the last, for the simple reason there is no trouble to separate out the species. Fortunately, in only one instance, was there a single specimen to repre-

sent a species, that, however, *extrincicella*, is so distinct from all others that it could not be an intergrade; of one other there were two specimens, of the balance from three to thirty odd. The largest number were of my bred specimens, *carduiella*, and of all of this number thirty-eight specimens, the marks, colors, shape, and size are constant in each, excepting, of course, the ♂ is slightly smaller than the ♀.

Unfortunately we have but little knowledge of the larval habits and life-histories of our American species. When these are all worked out we shall have better evidence to go by than classification based principally on coloration. Miss Murtfeldt has recorded the finding of the larvæ in communities on *Gnaphalium polycephalum* webbing the leaves and when nearly mature spinning quantities of somewhat viscid silk. In the National Museum are quite a number of specimens bred by Chittenden in the vicinity of Chicago on the same plant and with the same habit. Miss Murtfeldt's bred specimen is identical with the Chicago specimens, as are also flown specimens taken by Dr. Dietz at Hazleton, Pa., and all are very distinct from any other North American species. This species I have named *gnaphaliella*.

The larvæ of *silphiella* were found by Mr. Coquillett in Illinois on *Silphium integrifolium* in nests formed by fastening the terminal leaves together by a few threads.

I found the larvæ of *carduiella* feeding on the pith inside the main stalks of *Carduus spinosissimus* at Anglesea, N. J.

It will be observed that the habits of the only three larvæ known are quite different, the first spinning considerable silk and webbing the leaves, the second fastening leaves together with silken threads and the third, borers in the stalk. These differences in larval habits, not to mention the different food plants, would seem to indicate different species, especially as in the case of the first named, bred by two people, in different localities, but with exactly the same habits and producing exactly the same moths. The earlier descriptions of the larvæ are brief but they also seem to indicate differences.

As our early entomological literature is so widely scattered and frequently almost unavailable to the majority of working entomologists from having been published in foreign magazines or early American journals that have long been out of print, I have taken the liberty of repeating the original descriptions and the few references to the American species of the genus, so as to bring together in one paper

all of the information on the subject that I have been able to locate, hoping it will be of assistance to others who may become interested in this group.

After each description I have also stated the chief claims for specific difference, usually in a comparative way to quickly assist in the identification. I have found one reference to American species of this genus by Zeller in Verh. Zool. Bot. Gesell. Wien, XXV, 320, 1875, of which the following is a literal translation:

"*Choreutis pretiosana* DUPONCHEL, Suppl. IV, 182, pl. 65, f. 9.

"*Choreutis vibrana* var. *australis* ZELLER, Isis, 1847, p. 643.

"This species, which is found in the vicinity of the Mediterranean Sea, is separated from *bjerkandrella* Thunb. (*vibrana* Hubn.), only by its smaller size and lighter color, the markings are identical but the fore wings of *bjerkandrella* have not always a less convex hind margin. Besides *pretiosana* differs somewhat in size and the ♀ is somewhat smaller than the ♂.

"The seven North American examples before me are still smaller than the ♀ of the European *pretiosana*. In the four from Texas, the two curved bands composed of raised scales (the first rather straight before the middle, the second bent and enlarged by two-thirds above the middle) are light gray, in the three from Ohio, which Schläger determined as *australis*, are pure white, so that the scales, under an ordinary lens, on the outer band are only indistinctly visible. (If these white bands are constant, these specimens may be separated as var. *ohioensis*.) I have taken in Syracuse (Asia-Minor?) a similar ♀ less distinctly white, but agreeing otherwise.

"That the specific identity between the American and European examples is certain, and as an importation is not to be thought of *pretiosana* can be added to the species originally common to both continents."

I feel quite sure had Zeller the opportunity for studying large series of specimens from all parts of North America, he would have modified the views as expressed above, in fact Lord Walsingham, who has, I believe, the identical Texas and Ohio examples referred to by Zeller has compared them with specimens of *carduiella* and pronounces them distinct and even expresses a doubt that the European forms occur in this country at all, as will be noted in copy of his letter under the caption of *carduiella*.

Lord Walsingham, in Trans. Am. Ent. Soc., 1882, Vol. X, p. 167, refers to *bjerkandrella* and says:

"This species has not, so far as I am aware, been recorded from North America. I have received it from Miss Murtfeldt, from whom the specimens in Professor Fernald's collection were also obtained. It occurs also in California, together with a form identical with, or very closely allied to, *Choreutis silphiella* Grote (Papilio, Vol. I, p. 40), which must probably be regarded as distinct."

SYNOPSIS OF SPECIES.

Fore wings pointed at apex.
  With metallic scales on hind wings.
    A few green metallic scales on fore wings.....**inflatella.**
    Metallic scales lilaceous only.....var. **virginiella.**
  Without metallic scales on hind wings.....**dyarella.**
Fore wings rounded at apex.
  Fore wings ochreous at base.
    Hind wings heavily white-banded.....**silphiella.**
    Hind wings with short white dash.....**gnaphaliella.**
    Hind wings with no white dash.....**carduiella.**
  Fore wings brown at base, or slightly ochreous.
    Fore wings with two prominent white bands.....**onustana.**
    Fore wings with the bands not white.
      Basal brown space without or with but a faint lilaceous band.
        Outer edge of cloud defined by a curved line.....**sororculella.**
        Outer edge of cloud indefinite; wings elongate.....**coloradella.**
      Basal space crossed by a whitish band.
        This band curved.
          Outer half of brown basal area not clouded with whitish scales.....**occidentella.**
          Outer half of brown basal area clouded with whitish scales.....**busckiella.**
        This band straight.....**extrincicella.**
  Fore wings white at base.....**leucobasis.**

Choreutis inflatella *Clem.*

1863. *Brenthia inflatella* CLEMENS, Proc. Ent. Soc. Phil., Vol. II, p. 5.
1872. *Brenthia inflatella* STAINTON, Tineina No. Am., p. 209.
1900. *Choreutis inflatella* DYAR, Can. Ent., Vol. XXXII, p. 85.
1900. *Choreutis inflatella* FERNALD, Can. Ent., XXXII, p. 242.

Original description:

"Fore wings dull orange; in the middle of the wing dark fuscous, dusted with white. At the base of the wings are three or four small spots of a beautiful metallic green, and two others of the same hue, on the disk, between which, on the costa, is a small white spot. At the apical third of the wing is a curved metallic green band, extending from the costa to the inner angle, beginning on the costa in a small white spot. A little beyond the metallic line, towards the base of the wing, on the inner margin, is a small spot of the same metallic hue. Near the hinder margin is a subterminal dark fuscous line, which from the costa to the middle of the wing is overlaid with metallic green scales, and on the costa between the two transverse lines, is a white spot. Cilia fuscous, white in the middle of the wing. Hind wings dull fuscous, with two iridescent spots near the inner angle. Abdomen with two iridescent spots near the tip.

"Antennæ fuscous, annulated with white. Head and labial palpi gray varied with fuscous. Feet dark fuscous annulated with white. I have before me a single specimen taken on the wing in July."

Var. **virginiella** *Clem.*

1864. *Brenthia virginiella* CLEMENS, Proc. Ent. Soc. Phil., Vol. III, p. 505.
1872. *Brenthia virginiella* STAINTON, Tineina No. Am., p. 257.
1900. *Choreutis virginiella* DYAR, Can. Ent., Vol. XXXII, 85.
1900. *Choreutis virginiella* FERNALD, Can. Ent., XXXII, 243.

Original description:

"Fore wings dark brown, tinged with ochreous between the markings towards the tip, with an oblique, somewhat violet-hued silvery line, from the costa at the apical third, directed towards the anal angle; a line of the same hue from the tip of the wing, parallel to the hinder margin, and a white costal streak equidistant from the two silvery lines. On the inner margin, a little interior to the anal angle, is a silvery, somewhat violet hued spot. Cilia whitish beneath the tip of the wing, with a dark intercilial line. Hind wings dark brownish, with a silvery spot near the hinder margin above the anal angle. A single specimen. Virginia. Coll. Ent. Soc. Phila."

It is unfortunate that Dr. Clemens could not have reversed the order of publication of the above descriptions, so that the form with lilaceous scales only (*virginiella*) could be the species, and that with a few scattered greenish metallic scales (*inflatella*) the variety, as the former is the most common form. I have before me seven specimens of *virginiella*, five taken in the vicinity of Montclair, N. J., and two from collection of Dr. Dietz, labelled Toronto, Can., and have examined at the National Museum one specimen from Boston, Mass. (coll. Beutenmüller). There is also in the National Museum one specimen of *inflatella* (locality unknown).

The only difference that I can discover and in fact the only difference in Dr. Clemens' descriptions, although they are differently worded, of *virginiella* and *inflatella* is that the latter has a few greenish metallic scales on the inner and costal half of fore wings, while on *virginiella* all the scales are lilaceous. The outer marginal band of metallic scales on *inflatella* as well as other scales on outer half of fore wing are of this same color. So the only difference is that while in *virginiella* all the metallic scales are lilaceous, in *inflatella* some are lilaceous and some have a greenish reflection. I do not consider this a specific difference, but it may be known by its varietal name at least until the life history is known. It is probably the most distinct and least variable of any of the species of this genus, its nearest prototypes being *C. myllerana* F. of Europe and the larger Pacific Coast form *dyarella*.

The chief distinguishing characters are:

1. Shape of primaries unlike any *Choreutis*, except *dyarella;* apex terminates in a sharp point and outer margin nearly straight; in these

respects it more nearly resembles the genus *Simæthis*, where it may finally land.

2. A triangular ochreous area extending from tip along one-third of costa, thence to hind angle; this is divided by a paler ochreous wedge-shaped streak, widest at costa and pointed at hind angle.

3. On the costa, enclosed by the pale ochreous streak is a white spot, or triangular dash, base line along costa, lower apex pointing towards hind angle. There are two additional minute white costal spots, at equal distance apart, between this larger spot and base.

4. In fresh specimens the inner half of primaries are very thickly powdered with cream color scales.

Choreutis dyarella, sp. nov.

Dark brown, mixed with whitish scales. Fore wings shaded with bronzy red, most distinct on apical half; a few metallic scales towards base. A straight white shade from costa to inner margin at basal third, forming a distinct spot on costal edge. A similar narrow line at outer third forming a dot on the costa, two at end of cell and one on internal margin. A strongly curved line of metallic scale joins the costal and marginal dots, is twice broken and touches outwardly the third transverse white band, which reaches from costa before apex to anal angle and is nearly continuous, and is broken only at upper third where the metallic scale band touches it. The submarginal streak of metallic scales not reaching the apex. Fringe white, black at apex and anal angle with a brown spot in the middle.

Hind wings blackish, the usual submarginal dash yellowish-white, distinct. Fringe black with basal yellowish-white line; outer half white except at apex and anal angle.

Wings below smoky brown. Two obscure white dots on costa and a few scales outwardly on fore wings. Hind wings with outer irregular white curved line with a lunate white discal streak. Tarsi strongly banded with white. Femori blackish, with a median whitish band. Expanse, 12 mm.

Described from three specimens from Dunsmuir, Cal. (Wickham).

National Museum type No. 6263, one co-type in my collection.

I take pleasure in naming this species after Dr. Dyar.

This is a slightly larger species than *inflatella*, but it belongs to the same group, with acutely pointed fore wings.

It can be distinguished from *inflatella* by: (1) Larger size, (2) no metallic scales on hind wings, and (3) white submarginal band on under side of hind wings, in *inflatella* this band is reduced to a fine almost obsolete line.

Choreutis onustana *Walk.*

1864. *Simæthis onustana* WALKER, Cat. Lep. Het., Pt. XXX, 996.
1875. *Choreutis ohioensis* ZELLER, Verh. Zool. Bot. Ges. Wien, Vol. XXV, 320.
1900. *Choreutis onustana* DYAR, Can. Ent., Vol. XXXII, 85.
1900. *Choreutis onustana* FERNALD, Can. Ent., Vol. XXXII, 242.

Original description:

"Male. Ferruginous. Palpi acute, not longer than the breadth of the head, with a long dense fringe beneath; third joint lanceolate, much shorter than the second. Antennæ setose. Fore wings rounded at the tips, with two irregular, whitish slightly curved bands, and with several glittering chalybeous black-bordered dots; first band before the middle, more oblique than the second, which is beyond the middle; a chalybeous streak along the basal part of the costa; fringe bordered by two cinereous lines. Length of body 2 lines; of the wings 6 lines."

"Nova Scotia. From Lieut. Redman's collection."

The general appearance, shape and size of this species is not unlike European *pretiosana;* it differs from it in having two wide irregular pure white bands extending from costa to hind margin on the fore wing. Zeller received three specimens of this species from Ohio and suggested the name of *ohioensis*, if it should prove to be different from *bjerkandrella*, but Walker's description was made in 1864 and Zeller's name must go in the synonymy.

Walker gives locality Nova Scotia; Professor Fernald adds Amherst, Mass.; Dr. Dietz has specimens labelled Central New York, June 1, 1887. In the National Museum are specimens from New Hampshire and Ontario (Hanham), so it seems to be a northeastern species with Ohio as the south and western limit. It can be distinguished readily by the two broad, irregular, white bands, extending from costa to hind margin. The inner band is at inner third and outer band beyond outer third.

Choreutis gnaphaliella, sp. nov.

Light brown or fuscous. A broad inner band and a narrow band near margin, thickly sprinkled with whitish scales. Three large black spots.

Antennæ dark brown, ringed with white. Head, palpi fuscous, latter white at base; outer ends of scales on head paler. Thorax yellow, ochreous, a median line of whitish scales, patagia edged with ochreous.

Fore wings: Basal area ochreous, divided on median line by line of metallic scales, also a fine line of same on costa and a few metallic scales close to hind margin on outer edge of ochreous patch. A broad, oblique, slightly curved band of light brown heavily dusted with whitish scales, from costa to hind margin, outer edge irregular; a few scattered metallic scales on this band near costa and near hind margin. A large oval, black velvety spot in center of outer half, a smaller black spot on hind margin below and inwardly to large spot, a rectangular black spot on outer margin beyond large spot; all of these spots separated from each other by ground color; a few black scales follow apical line. Between central black spot and costa is a rectangular area of brown and ochreous scales, becoming almost black at outer edge; just beyond this, before apex, is a small patch of almost white. Scales forming a white costal spot. In every place where there are black spots or scales, they are overlaid with metallic scales. Outer marginal band brown, sprinkled with white scales; this band extends out on the fringe; the latter is fuscous.

Hind wings: Light fuscous, veins darker. A whitish subterminal dash. Fringe fuscous, shadowed by two pale marginal lines, outer edge paler.

Under side fore wing: Pale fuscous; white marginal line from costa to hind angle, paralleled by an inner whitish line. A white spot on costa at inner third, another on hind margin at inner third. Under side hind wing: Pale fuscous, a paler marginal line becoming white and broader at apex, nearly paralleled by a broader white band, inside of this is a white dash. Abdomen brown, a band of whitish scales at posterior edge of each segment. Legs so thickly covered with white scales that ground color is almost hidden; except tarsi, pale golden beneath and an alternate brown and white ring on each joint above. Expanse, 7.5 to 8.5 mm.

Described from eight specimens. St. Louis, Mo. (Miss Murtfeldt), Hazleton, Pa. (Dr. Dietz), Chicago, Ills. (Chittenden).

Type, U. S. Nat. Mus., No. 6264; co-type, Collections, Murtfeldt, Dietz, Kearfott.

The following description of larva and habits by Miss Murtfeldt is quoted from Professor Fernald's paper, Can. Ent., XXXII, p. 241:

"The larva is found late in June (in Missouri), and again in October, mining and webbing the leaves of *Gnaphalium polycephalum*. When small it works chiefly between the cuticles of the leaves, but later feeds externally, spinning quantities of somewhat viscid web, among which the black powdery frass is profusely scattered.

"The mature larva is 6 mm. in length by 1.5 in diameter across middle segments, from which it tapers very slightly in both directions; form cylindrical, submoniliform. Color translucent, whitish green, immaculate. Head oblique, same color as body, but horny and polished. Collar inconspicuous. Legs concolorous with general surface. Before the first transformation it becomes gregarious, the larvæ spinning their dense white sticky cocoons, something to the number of a dozen in close proximity in the general web.

"Pupa pale golden brown, 4 mm. in length, and rather stout, with no especially marked characters. Imagines in seven or eight days after pupation.

"In central Missouri the species is rather rare, and, within the limits of my observation, has only occurred three times within the last dozen years, although careful watch for it has been maintained upon its food plant. So far it has not been found upon any *Gnaphalium* or *Antennaria*, except *G. polycephalum*. I have never taken this species at light."

Choreutis silphiella *Grote.*

1881. *Choreutis silphiella* GROTE, Papilio, Vol. I, p. 40.
1882. *Choreutis silphiella* WALSINGHAM, Trans. Am. Ent. Soc., X, 167.
1886. *Chalcœla gemmalis* HULST, Trans. Am. Ent. Soc., XIII, 148.
1890. *Choreutis silphiella* DYAR, Can. Ent., Vol. XXXII, p. 85.
1890. *Choreutis silphiella* FERNALD, Can. Ent., Vol. XXXII, p. 241.

Original description:

"Thorax orange, with a metallic stripe on the tegulæ. Head olivaceous. Pectus and basal joint of palpi whitish. Fore wings with the base orange, to a dusky, inwardly oblique, transverse shade line. A longitudinal metallic stripe before the

shade line below costa and some metallic scales below median vein. Middle of the wing mottled, grayish, enclosing two metallic discal spots edged with black, superposed; below them two faint blackish lines to internal margin. Apical portion of the wing taken up with a wide circle of dusky and orange scales enclosing a series of metallic points edged with black. The space enclosed by the circle, near the margin, is gray and mottled like the middle of the wing. The metallic spots have a violet or green reflection. The circle is twice cut by oblique orange stripes, over the subcostal nervules and over the median nervules, in opposing positions. Edge of the wing dusky, fringes dark. Costal edge with two white dots beneath, wide apart. Hind wing blackish; beneath crossed by a white sub-terminal band, and another before the middle of the wing. Length of fore wing 5 to 6 mm.

Hab. Illinois.

The larva of this species is described by Mr. Coquillett as follows:

"Body thickest at the middle, tapering towards each end, pale green; a dark colored dorsal line; piliferous spots and cervical shield green; head small, nearly horizontal, pale green, with a black dot on each side near the jaws, and usually with a black dash on each side near the junction of the head with the first segment; venter pale green, unmarked; 16 legs; length, 13 mm. Lives in communities on *Silphium integrifolium* in nests formed by fastening the terminal leaves together with silken threads. Found June 19; imagoes July 2."

Mr. Grote prefaces the above with the following: "Mr. Coquillett has communicated to me specimens of a *Choreutis* which he has reared, together with a description of the larva. The species appears to be new and is considered by Professor Fernald to be distinct from *pretiosana*." Mr. Grote concludes his description with the statement: "a distinct but allied species of *Choreutis* has been collected by Mr. Hy. Edwards in California (Sierra Nevada)."

The following is Dr. Hulst's description of *Chalcœla gemmalis*, which is manifestly the same as Mr. Grote's species. I have not been able to find Dr. Hulst's types.*

"Expands 15 mm. Head brown, palpi brown, fringe in front; thorax and basal portion of fore wings rich golden brown; fore wings beyond light ochre, with fuscous shadings; margin yellowish brown, fringe black; near middle of wing, also just within indicated extramedian line, and also on subterminal space at middle, is a velvety black spot, the three being in a row; a fine black line runs from costa to middle spot; there is also midway along costa a faint subcostal black spot; each of all these spots surrounds a few bright golden metallic scales; there is also a line of metallic gold basally along costa; hing wings nearly even, fuscous; beneath, fuscous with a golden tinge, a white spot on costa at beginning of outer line, which is indistinct; an outer cinereous line on hind wings; all margins with whitish lines; fringes fuscous.

* Mr. W. Beutenmüller informs me that Hulst's type of *C. gemmalis* is in the Hy. Edwards collection, American Museum of Natural History, and he has compared it with a specimen labelled *C. silphiella* Gr., and finds them identical.

"Two ♂♂, Sierra Nevada Mountains, Cal. The second specimen has the golden brown of thorax and fore wings replaced with fuscous."

In a general way this resembles the European *bjerkandrella* Thunb., but I have no hesitation in pronouncing it distinct, and moreover from the material I have had an opportunity to examine it is not especially variable. Compared with *bjerkandrella*, the primaries are quite different in outline, in *bjerkandrella* they are rather short and rounded, while in *silphiella* they are elongated and the outer margin instead of being an easy curve is nearly straight. The ochreous base extends farther along the costa than in *bjerkandrella* and its area is greater. The general color of *silphiella* is lighter. The white lines and dashes on the hind wings are much broader in *silphiella;* this is especially apparent on the under surface. The fringe on the hind wings is longer in *silphiella*.

This species has a wide range. Coquillett, who bred the specimens from which Grote described it, took the larvæ in Illinois, Lord Walsingham collected specimens which are labelled "Head of Noyo R., Mendocino Co., Cal., June 8 to 11, 1871." I have specimens from Yellowstone Park, Wyo. (Burrison), and Chicago (J. H. Reading).

In all of the specimens the marks and characters are constant with very slight variation, certainly not enough to warrant a connecting link between it and any other species recognized in this paper.

Its distinguishing characters are: (1) Large size, expanding 15 mm.; (2) ochreous patch at base of primaries, involving one-quarter of length of wing, head and thorax of same color; (3) outer three-quarters of primaries thickly sprinkled with cream color scales; (4) two large velvety black spots on outer half, ornamented with metallic scales, and (5) broad white dashes and lines on inferiors.

Choreutis carduiella, sp. nov.

Dark brown, thickly dusted with cinereous scales, without a lens the ground very dark, almost black, slate color.

Antennæ dark brown, ringed with whitish, tuft at tip of basal joint. Palpi brown, streaked with orange on second joint, basal joint almost white.

Head brown, dusted with white specks. Thorax orange-ochreous streaked with cinereous; outer edge of patagia and two streaks on mesothorax cinereous. A row of greenish metallic scales on inner edge of patagia.

Fore wings: Deep fold at base of median vein, above this at base is a tuft or streak of long raised orange-ochreous scales, below it is a smaller patch of shorter scales, same color in ♀ but dark umber in ♂; between these ochreous streaks on median vein, also on costa next to base, is a fine line of metallic scales, also a few metallic scales below ochreous patch near inner angle. Next, outwardly, is a broad

band of ground color from costa to hind margin, thickly sprinkled with cinereous scales, this band is divided on its lower half by a darker line free from lighter scales; on the outer edge of this patch is a line of metallic scales extending half way across wing from costa. Adjoining this outwardly on costa, is a broad patch of long raised orange-ochreous scales, lower edge covering end of cell. On the outer edge of this patch is a line of metallic scales separating it from a short dark oblique line.

Below orange patch is a large velvety-black spot, extending to outer margin, but not to hind margin, this black patch is cut near its outer truncate end by a line of orange-ochreous scales. Many metallic scales are sprinkled over the black. Just below orange patch, in center of wing on hind margin, is a small black spot, beyond this is a smaller black spot. The long raised scales forming the large orange patch above end of cell, become darker and almost black in the lower central part, where it adjoins the black patch just below, these dark raised scales are heavily sprinkled with metallic. The lower, outer edge of black patch, which closely follows line of hind angle is defined by a narrow row of metallic scales. The outer margin below apex is of ground color heavily overlaid with lighter scales, except at the apex, which is almost free from these scales. Along costa just before apex is a short line of darker ochreous, inside of this is a fine line of metallic scales, slightly curved downward at outer end, bordering this on the inner side is another irregular band of ground color free from lighter scales, inwardly is a broader band of ground color, heavily overlaid with whitish scales, extending from costa to center of outer margin where it is absorbed in the marginal band. Fringe fuscous.

Hind wings fuscous, no white dash, but a very few scattered whitish scales forming a thin line along margin at and before apex. Fringe lighter fuscous.

Under side fore wings; dark shining fuscous, a white oblique dash at outer third; this white dash is obsolete in some specimens; a line of white scales along margin and another line of white on fringe paralleling marginal line, a few whitish scales inside of hind angle.

Under side hind wings; same color as fore wing, a short apical curved white line, a long curved submarginal white line, interrupted at upper third and a white dash in center of wing; a small white dot on costa about middle of wing. The white lines and marks on under surface have a bluish reflection.

Abdomen: dark brown, almost black, broad band white scales at posterior end of each segment, anal tuft blackish. Legs blackish, thickly sprinkled with white scales; tarsus golden on under side, white ring on each joint on upper side. Expanse, ♂ 10 mm., ♀ 12 to 13 mm.

Described from thirty-eight specimens bred from *Carduus spinosissimus* Walt. Taken at Anglesea, N. J., June 21–23, 1901. Issued July 2–10.

Types: ♂ and ♀. U. S. Nat. Mus., No. 6265.

Co-types: Collections Walsingham, Meyrick, Dietz, Kearfott, Murtfeldt, and Am. Mus. Nat. Hist.

Larva. Last Stage: 12 mm. long, cylindrical, head and second segment slightly tapering, anal end rather blunt. Color pale yellow.

Head: Width .95 mm.; length 1.05 mm.; color pale chestnut, strongly bilobed,

lobes full and rounded; clypeus narrow at base, evenly triangular, high but not reaching to second joint, suture between lobes deeply indented; occelli on black field; epistoma lighter chestnut or yellowish, labrum and maxillæ brown; antennæ short; spinneret large, with a long spine or thick hair. On back edge of each lobe, partly hidden by segment 2, is a triangular black spot and short black line following joint dorsad. Setæ on head long, ½ to ⅔ thickness of head.

Thoracic feet pale chestnut, basal joint of each whitish and defined by narrow chitinous oval band, this band not complete, but absent on outer or lateral edge. Shield on second segment same color as head, divided by paler dorsal line, moderate, front edge straight, hind edge rounded, bears six setæ each side in usual position, a large brown tubercle before and on a line with spiracle bears two setæ; another large tubercle bearing two setæ below spiracle. Segment three (mesothorax) tubercles,ia + ib, iia + iib, iii separate, iv + v; the first two and last in a vertical row, iii between and caudad to iia + iib and iv + v; vi on center of segment just above foot. The tubercles or tubercular plates are largest and darkest on prothoracic segment, slightly less on next and paler on metathorax, and all are darker than the abdominal plates.

Abdominal segments i dorsad and cephalad to ii, iii dorsad and close to spiracle, iv and v united caudad and cephalad to spiracle vi above base of proleg and just below it on base of proleg is another small tubercle bearing a single seta (vi–a?).

Anal shield not chitinous. Abdominal tubercular plates are moderately large, pale brownish-yellow. Setæ are pale, rather long, about half body diameter. Crochets on abdominal feet in closed circles, hooks brown. Tubercles on head look like tiny globules of clear glass resting on the flatter surface, the tubercles on the body tubercular plates are also tiny globules or points, from which the setæ arise. Spiracles slightly elliptical and ringed with brown.

Skin slightly granulated and covered with very minute hairs.

Cocoon: Boat or hammock-shaped, pointed at each end, 15 to 20 mm. long, 3 to 4 mm. wide, of soft fine pure white silk of the same appearance and texture as the egg-nests of some spiders.

Pupa: Bright chestnut, darker on dorsum, very smooth and rounded; on each abdominal segment dorsal surface is a finely fluted ridge, very minute hooks on anal segment; all abdominal segments free, no organs free but after dehiscence antennæ cases are free. 6 mm. long, 1.5 mm. thick.

Habits: Feeds on pith in main stalks of *Carduus spinosissimus*, from two or three to a dozen or more may be found in each stalk, they excavate a gallery nearly its whole length, common to all; gallery not lined with silk, at convenient intervals and usually just above a new joint or above where stalk branches forth are small holes, through which the frass is ejected outside of the stalk. In fact an easy way to ascertain if the stalks contain larvæ is to examine them for considerable masses of frass resting in the angle between the main stem and branches.

All the larvæ that I observed were within the stalks, but there is

evidence that they come outside, as the under side of the leaves was covered with a slight web of silk. This may be the foundation for cocoons which are spun under the leaves and below the thistle head in any convenient partially protected angle. It is also possible that the larvæ eat the epidermis from the under side of the leaves, as they appear to have been eaten in spots, but not nearly sufficient for the sustinence of the larvæ and my opinion is that their principal food is the pith.

Mr. Meyrick makes the following comparison between *bjerkandrella* and *carduiella*:

"On comparison of your specimens of *Choreutis* with *C. bjerkandrella*, I am decidedly of the opinion that, though very closely allied, they are quite distinct specifically. It would be *possible* that the exhibition of connecting forms from other parts of America might modify this view, but I do not know of any such. The points of difference on which I should rely are as follows:

1. *C. bjerkandrella* has a silver spot on the middle of the costa of the fore wing, which is wholly absent in your species.

2. In *C. bjerkandrella* the two light fasciæ of fore wing form white spots on costa, in yours they do not.

3. In *C. bjerkandrella* the anterior edge of the second light fascia is entire, whilst in your species it is interrupted from the middle to near dorsum, there being a fulvous streak in its place, which is absent in *bjerkandrella*.

4. The fasciæ of lighter irroration are much broader and more extensive in your species.

5. The silver streak on the anterior margin of the second fascia towards costa is very much more oblique in your species.

6. In *C. bjerkandrella* there is a short white post-median bar in hind wings; in your species this is barely indicated by two dots or two white scales each, which are moreover differently placed and nearer the termen.

These points appear to me to be all quite constant, and fully sufficient.

I enclose a specimen of *C. bjerkandrella* from New Zealand as a type for your use; I am not aware that it differs in any obvious way from South European examples.

Does the true *C. bjerkandrella* occur in America, or do the published records of it refer to your species?

Lord Walsingham's comparison of *bjerkandrella* and *carduiella* is as follows:

"I am very much obliged to you for allowing me to keep the three specimens of *Choreusis* sent for examination. I am not acquainted with any description of either of them.

"At a time when I was not in possession of so large a series of North American representatives of this genus as I now have, I was unable to separate specimens from California or from Missouri from the European *bjerkandrella* Thunb., which has been

joined to *pretiosana* Dup., by Staudinger. Zeller regarded these two European species as distinct at the time when he identified specimens from Texas and Ohio as *pretiosana*, and his specimens, now before me, are certainly nearer to this than to the typical *bjerkandrella*, but I now see differences which may possibly be of special value in all of the American species.

"Your two New York examples are nearer to *pretiosana* Dup. (= *australis* Z.) the South European form, but they differ in having no markings on the under side of the fore wings, and in the presence of a small metallic spot above the dorsum on the inner edge of the first pale sprinkled band near the base. This occurs also in Zeller's and Murtfeldt's specimens, but not in the European forms. I think your two New York examples are distinct from all with which I am acquainted. Notably, in the absence of a distinct pale streak on the upper side of the hind wings. As you have compared it with American types you are probably justified in separating it. I send you two specimens of *silphiella* Grote. It seems to me rather a stretch of imagination to lump this with *bjerkandrella*."

Choreutis busckiella, sp. nov.

Dark brown, heavily overlaid with whitish scales, with only a trace of ochreous.

Antennæ brown, ringed with white. Palpi brown, whitish at base. Head and thorax brown, dusted with white, no ochreous scales, a few silvery metallic scales along lower edge of patagia.

Basal area dark brown, a faint streak of ochreous below costa, in some specimens no trace of ochreous, costa at base black, overlaid with metallic scales; a wide dark brown band beginning at costa extends downward half and then at right angles to hind angle. On the lower end of this band is the usual velvety black patch; in this species it is large and almost rectangular, cut near its lower end by a double line of dark brown; between this dark band and basal area as well as the balance of fore wing is of ground color heavily overlaid with whitish.

Metallic scales occur: a line on costa near base, a short line below on median line and a few scales below this near hind margin; on first white band, a line of scales extending from costa nearly to hind margin just beyond first third, this line interrupted twice and curving slightly outward at lower end; three small spots in oblique line from costa on dark brown patch, below this is short horizontal line; a line of scales beginning at costa outer third and following margin around apex and outer margin to hind angle, interrupted once above and once below apex. Fringe brown.

Hind wings grayish-brown, a short curved line of whitish scales about center of outer margin and a few scattered whitish scales at apex. Fringe brown.

Under side fore wings immaculate, fuscous. Under side hind wings fuscous, narrow band whitish, parallel to outer margin, a shorter whitish line within this, and a short dash about center of wing.

Abdomen brown, under side whitish. Under side thorax white. Legs brown, sprinkled with white. Expanse, 12 to 13 mm.

Three specimens, Hastings, Florida. (A. J. Brown), March 15 and 16.

Type, U. S. Nat. Mus., No. 6307; co-type, Collections Dietz and Kearfott.

I am glad to honor this species with the name of my friend, Mr. August Busck, to whom I am under many obligations for assistance and advice, and who will, in a very brief time, be known as our foremost American authority on Tineidæ.

This species differs in the almost total absence of ochreous from the thorax and fore wings, and in the almost uniform color of the latter. The fore wing is divided almost equally into four bands, the basal and second intermediate brown or black and the first intermediate and marginal almost white. Its nearest ally is *carduiella*, and it may, when the life-history is known, prove to be an extreme form of this. It can be distinguished from *carduiella* by: (1) ochreous obsolete or nearly so; (2) much lighter and whiter in color, and (3) whitish curved line on hind wing.

Choreutis sororculella *Dyar.*

1890. *Choreutis sororculella* DYAR, Can. Ent., Vol. XXXII, p. 86.
1890. *Choreutis sororculella* FERNALD, Can. Ent., Vol. XXXII, p. 242.

Original description:

"Generally similar to *bjerkandrella*, Thunb., but without any traces of the yellow dashes at the base of the fore wings. The pale gray space in the middle of the wing is sharply limited without and within by a paler line; in the center of this space is a large group of black and metallic scales; beyond the pale line are no black scales, but a regular, distinct, subterminal metallic line; a subcostal metallic streak in basal space. Hind wings with a white dash as in *onustana*."

"Two examples. Placer Co., California. June (A. Kœbele); U. S. Nat. Mus., type No. 4426."

I consider this a good species. It can be distinguished easily from *silphiella*, *gnaphaliella*, etc., by the narrow whitish band next to outer margin, which curves easily and evenly, slightly inwards to the costa; whereas, in *silphiella*, etc., this band is sharply right-angled at about one-third from the costa besides broadening out into a spot.

The basal area of front wings is uniformly light fuscous, next outwardly is a large patch of whitish; this patch only touches costa at a point next to basal fuscous patch. Inside of white band along outer margin are three velvety black spots, arranged in the form of a slight crescent.

Distinguishing characteristics: (1) General color pale fuscous, no ochreous, (2) marginal white band slightly curved, not angled, (3) velvety black spots arranged in a crescent following line of outer margin. Center spot slightly larger than other two.

Choreutis extrincicella *Dyar.*

1890. *Choreutis extrincicella* DYAR, Can. Ent., Vol. XXXII, p. 86.
1890. *Choreutis extrincicella* FERNALD, Can. Ent., Vol. XXXII, p. 242.

Original description:

"Light brown, head and palpi whitish. Fore wing with basal half brown, crossed by a broad, straight, white line with a few silvery scales outwardly on costa. Terminal half of the wing nearly white, except narrowly along outer margin, streaked above with longitudinal, somewhat cuneate, lines of black scales, below containing a single elongate, rounded, black patch with two groups of silvery scales; similar scales on outer border of white patch; outer half of fringe white. Hind wings pale brown. Expanse 12 mm."

"One male. Wisconsin. U. S. Nat. Mus., type No. 4427."

The species is more unlike the general *bjerkandrella* type than any of the genus. It is a very beautiful species and Dr. Dyar fortunately, when making his description, had before him an almost faultless specimen. It can be recognized at once by the large amount of white on the fore wings.

The largest patch of white almost entirely covers the outer half, extending from costa to hind margin. Near the anal angle is a velvety black spot, ornamented with metallic scales, this spot encroaches on and appears to be laid on the white. The outer margin is light fuscous. The inner edge of the large white patch is bounded by a broad almost straight fuscous band, next towards the base is a narrower whitish band, the base of wing is fuscous. All of these bands and colors extend from costa to hind margin. Hind wings are immaculate and under side of all wings are free from whitish lines and dashes and very pale in color.

It can be identified by: (1) Very large white patch on outer half of fore wing; (2) a single rectangular velvety black spot on this white area, near hind angle is also a very small black spot > shaped. This is close to margin and just above the large black spot. (3) Hind wings immaculate. (4) Under side of all wings very pale and free from whitish marks.

Choreutis occidentella *Dyar.*

1890. *Choreutis occidentella* DYAR, Can. Ent., Vol. XXXII, p. 86.
1890. *Choreutis occidentella* FERNALD, Can. Ent., Vol. XXXII, p. 242.

Original description:

"Grayish brown; basal half of wing of this color, with a curved white line across its center. Terminal half of wing filled, except somewhat narrowly along outer margin, by a large whitish patch, irrorate with brown scales, containing above

a small black patch and below a large quadrate one, cut by a whitish line transversely; silvery scales along costa basally, middle of wing, subterminally and in the black patch. Hind wings brown, immaculate. Below a faint, irregular, whitish, submarginal line on hind wings and two costal dots on fore wings. Expanse 14 mm."

"One male. California (Coll. Beutenmüller). U. S. Nat. Mus., type no. 4428."

I consider this a good species; it can readily be separated from *silphiella* by the absence of the ochreous patch at base of front wings, in place of which is a whitish curved band, convex outwardly, just beyond base and extending from costa to hind margin.

The pattern of coloration and metallic scales on the apical half of front wings is not unlike *leucobasis*, inasmuch as in each species there is a large wheel-like or circular mark; in *occidentella* the upper part is defined by two white dashes on the costa, enclosing an area more or less suffused with whitish scales, the lower part is defined by a pair of velvety black spots. Dr. Dyar described the species from one specimen labelled "California." In my collection is one specimen from Yellowstone Park, Wyo., taken by Mr. Burrison late in June or early July, 1900. My specimen differs from type only in that there is less white in the circular mark referred to.

This species can be distinguished by: (1) Head, thorax and basal half of fore wing brown, (2) curved white line from costa to hind margin, close to base and (3) hind wings brown, not marked with white lines or dashes.

Choreutis coloradella, sp. nov.

Head, thorax, fore wings dark brown, sprinkled with lilaceous scales; basal hal of fore wings broadly of ground color; crossed in the middle by a faint curved lilaceous whitish band, sometimes obsolete. Outer half washed with lilaceous, except at margin, this area forming a large rounded patch reaching costa and inner margin, obscurely divided in the upper half by blackish veins; containing below an elliptical patch of black slightly raised scales, truncated outwardly, divided by an almost vertical line of whitish or faintly orange-tinted scales, marked with a few metallic scales.

A faint oblique metallic line from costa basal third to this patch below middle. A small curved subapical metallic line. In some specimens ground color becomes almost white in a dash bordering black patch above. Fringe blackish, interlineated with white. Hind wings blackish, fringe interlineated with white. Fore wings dark gray below, slightly washed with whitish towards apex, no definite lines. Hind wings washed with whitish except on veins. Expanse, 13 to 18 mm.

Described from six specimens. Durango, Colo. (Dietz), southwestern Colo. (Dietz), Colorado (Fernald), top Las Vegas range 11,000 feet, New Mexico (Cockerell), Sitka, Alaska (Kincaid, Harriman

Exp.). National Museum. Type No. 6266. Co-types in collections of Dietz and Kearfott.

This species is very distinct from any other of this genus. The wings are unusually elongate and it is the only species I have seen in which the basal ground color so prominently occupies the inner half of fore wings. The other half, excepting the outer margin and apex, is almost uniformly overlaid with lilaceous scales; thus the appearance of the fore wings is of two colors, almost evenly divided, the inner half brown and the outer half whitish. The upper surface of hind wings is blackish-brown, unmarked with whitish lines or dashes, in this latter respect alone it differs entirely from *silphiella*. But there is hardly a doubt the two species could be mistaken for each other, as *siphiella* is of various shades of light browns, yellows and ochreous, whereas *coloradella* is dark brown or blackish and sordid. It is very different in general appearance from *occidentella*, the latter is well marked with clearly defined and prominent white lines and bands which are entirely absent in *coloradella*. Professor Fernald, Can. Ent., XXXII, p. 242, 1900, under heading of *C. occidentella*, states he has "long had this species in his collection, under the name of *coloradella* and has so named it for others." I very much regret he did not publish his description, as I am well convinced the species will stand, and I take pleasure in giving it the name Professor Fernald had selected.

It can be distinguished by: (1) Large blackish brown basal area, (2) absence of ochreous at base or thorax, and (3) blackish-brown hind wings, unmarked.

Choreutis leucobasis *Fern.*

1900. *Choreutis leucobasis* FERNALD, Can. Ent., Vol. XXXII, p. 242.

Original description:

"Expanse of wings 10 to 12 mm. Head, thorax and base of fore wings pure white. Outer two-thirds of fore wings dark fuscous or reddish brown, with an oblique, white costal streak before the apex, and two others of the same color, but much smaller, on the costa between this and the white base of the wing. Outer part of the wing more or less overlaid with white scales, so dense beyond the cell as to fuse and form a distinct whitish patch.

"There are numerous clusters of metallic scales scattered over the outer part of the wing, some of which form a curved line around the apex on the border, and there are two large clusters of them resting on a black ground between the white patch and the fold. Fringes reddish brown.

"Hind wings and upper side of abdomen fuscous. Under side of all of the wings fuscous, with the white costal spots reproduced, and there are several whitish

cross lines on the under side of the hind wings. Under side of the body white. Legs white, annulate with black."

"Described from four specimens, two from London, Ontario, and two from Massachusetts. This species was figured by the late Townend Glover in his unpublished work on N. A. Lepidoptera, Pl. 83, Fig. 21."

This is a good valid species and distinguished easily from all others, now known, of this genus. Professor Fernald's types are from London, Ont., and Mass. I have one specimen taken near Clarendon, Vermont; one specimen, National Museum. No locality label. Characteristics: (1) Head, palpi, thorax and base of primaries (about one-quarter) white; (2) large black patch near hind angle, primaries crossed vertically by paler line of white and pink scales and a ring or eye like spot of metallic scales with center black, metallic scales distinctly raised.

I would very much appreciate the privilege of examining additional specimens of this genus, and will take pleasure in naming and returning promptly all examples that may be sent for that purpose, and especially would be grateful for notes or information pertaining to the larvæ or early stages.

MONTCLAIR, N. J., June 1, 1902.

DESCRIPTIONS OF NEW TINEOIDEA.

By W. D. Kearfott.

The majority of the following species are the result of breeding from larvæ found on various food plants in New Jersey.

I am indebted to Mr. August Busck for very kindly working up the genera of most of the species, in fact more than half of the species are described on his authority that they were unknown. I have also to acknowledge my obligation to Mr. C. L. Pollard for all the botanical determinations, excepting the conifera, also to Dr. W. H. Ashmead for all identifications of the hymenopterous parasites, and my thanks are especially due to Mrs. William Beutenmüller, for the very artistic and perfectly drawn figures for the plate that accompanies this paper; and it is with much pleasure that I can add my small testimony to the generally conceded opinion, that Mrs. Beutenmüller is the first in the ranks of the entomological artists of this country.

Symphysa adelalis, sp. nov. Plate IX, Figs. 11 and 20.

Head and thorax pure white, eyes black. Tongue short, yellow. Palpi short, porrect, second joint with long loose projecting scales beneath, apical joint short, not pointed; color white, shaded with pale golden-brown. Antennæ one third length of forewing, ciliated; basal joint white, enlarged, outer joints white, with annular rings of pale brown on each, darker on the inside. Forewing pure white, a few pale brown scales on median line at base, an interrupted band of the same from costa to inner margin, before middle, the scales within this band on the inner margin are very long and tipped with dark brown. An ovate discal spot of dark brown raised scales. A sub-outer marginal band of very pale brown from costa before apex to inner angle, broadening below and extending up to discal spot and below cell almost to and sometimes coalescing with inner band. A few raised yellowish scales, tipped with brown on costa just before apex, in some specimens this is a well-defined spot, in strongly marked specimens there are three small brown dots on outer margin, just below apex. Cilia a pale brown inner band, then a nearly white band, scales tipped with dark brown at apex, becoming paler below. The markings are repeated on the underside, but intensified, and concentrated into two patches of dark brown, one before the discal spot and one subapical. Hindwing pure white, with two shades or patches of light brown on the inner margin, the inner about middle of margin extends upward to cell, the outer beginning at anal angle reaches to within a quarter or a third of apex, nearly parallel to outer margin, in the darkest specimens these shades almost or quite coalesce at their upper parts. There are two tufts of very long raised white scales, tipped with brown, one on median line beginning at base and ending over inner brown shade where the brown tips form a distinctly darker spot, the lower one extends from inner angle to about inner third of dorsum, and the brown tips form another spot at

that point. In repose, especially when the wings are below the abdomen, so that the dorsum is in profile these two tufts and the long thoracic scales form a dentate outline of three prominent groups of scales. (The thoracic tuft white, the two dorsal tufts dark brown.) Cilia: white shaded with light brown lines, darkest opposite the dorsal patch. Underside: the pattern of the upperside is more or less faintly repeated, some specimens have three small dark brown dots, one about middle of cell, one on same line half way between end of cell and outer margin and the third close to the anal angle. Abdomen: first abdominal segment pure white, second shaded with brown, others to apex dark brown, with white scales at incisions. Underside white, slightly shaded with brown. Legs white, outer joints lightly shaded with brown. Alar expanse 12 to 16 mm.

Described from 46 specimens, issued from July to 20 August 15. Types U. S. Nat. Mus., no. 6970. Cotypes, Am. Mus. Nat. His., Acad. Nat. Science, British Museum and collection Kearfott.

Larva. — Full grown, 8 mm., extended 10.5 mm., flattened, annulated. Width segments 4 to 11, 1.9 mm.; width head 1.1 mm. broad, flattened, triangular, retractile into 2 and 3; head very dark brown, almost black, shining, mouth parts paler, almost square deeply cleft on top forming two well rounded lobes, shagrened; clypeus triangular, curving out slightly just above base, suture light brown. Antennæ long, pale at base, two outer segments black, joints paler, ocelli brown on darker brown field. Segments 2, contracted, smoky brown. Prothoracic shield divided from head by pale cream color collar, narrow, but extending down almost to spiracles, color brown clouded with paler shades and edged posteriorly and laterally with black. Anal shield small, concolorous, roughened but not chitinous. Thoracic feet unusually long, claws dark brown, upper segments pale brown. Four pairs abdominal feet but slightly developed, the crochets brown, small, circle slightly flattened or oval and not open, color brown. Anal feet the same. Spiracles concolorous. Dorsal setæ very short and minute, lateral setæ moderate, head setæ long, nearly equal to width of head. Tubercular plates large and polished, giving larva a shining appearance, the dorsal tubercles on 3 and 4 are like prothoracic shield, chitinous, smoky brown.

Pupa. — Very small for size of moth; 6 mm. long, 1.6 mm. diameter at thorax, rounded and tapering gradually to anal end which terminates in two very short knobs on the cremaster, each armed with a single short recurved hair. Eye caps prominent, oblong, reaching to vertex of head, clypeal space between eyes rather narrow and nearly closed just above labrum; labial palpi narrow, tapering to a point at their posterior end which is two thirds distance from vertex of head to end of wing cases; latter and thoracic feet cover sixth abdominal segment; antennal cases terminate half way between tips of wing cases and end of labial palpi. No spines or hooks on dorsal region. Setæ minute. Dehiscence: upper half of labial palpi separates on both sides thoracic feet cases, and remains attached to labrum, clypeus and eye caps. Another long separation occurs on each side between antennal cases and wing covers, also a split along dorsal line which extends to posterior edge of thorax.

About the latter part of June, 1901, when examining the tree trunks at Anglesea, N. J., for small moths, I found a very interesting larval case a little more than an eighth of an inch long roughly shaped like a flat-

tened figure 8 but rounded out instead of indented in the waist and which was made of very small particles of a nearly pure white lichen (Plate IX, Fig. 20, enlarged); this lichen occurring in patches on several species of trees in this sea- and wind-swept district, including oak, holly and juniper. I felt very certain I had discovered the habitat of one of our North American species of *Adela*, as the case very closely resembles the cases of that genus as figured in Stainton's Natural History of the Tineina, Vol. XIII.

Notwithstanding that an ample supply of the lichen was brought home with it, the larva failed to get beyond the stage in which I found it, although constantly watched until the spring of the following year. When, in 1902 I visited Anglesea again, at nearly the end of June, and began almost immediately on arrival a hunt to secure other cases of my supposed *Adela*, sp. The trees were there and the patches of lichen were common and for over two hours I scrutinized minutely and as I thought exhaustively, with never a case to reward my search; almost on the point of giving up the hunt I threw myself down on the soft white sand at the root of a large oak, and from force of habit kept my eyes on the white lichen although it was seemingly barren of insect life; after a few moments steadily gazing at one spot I fancied I witnessed a slight movement, still closer examination and the secret was out — a full-grown case this time, with the larva busily eating, and occasionally as he browsed, shifting his case a short distance and then securing it again with a few threads of silk. In five minutes on this same patch I had found eight more cases and in an hour or two ten times as many.

The home of this larva is a very beautiful illustration of natural mimicry, as it is composed of the pabulum of the insect, without change of color and almost without change of form, flattened and with edges pressed tightly to the lichenous bark, it is as nearly invisible as anything in perfectly plain sight can be, and I am afraid had not my first larva taken the notion, at the moment I was looking towards him, to move his house, he would be undiscovered to this day. A fresh supply of food was brought back to the city with the cases, and placed in a very large battery jar with the pieces of bark secured to short thin boards and all stood on end in the jar, to imitate the natural position of the bark; an occasional sprinkling with a fine hot-house syringe and the cover left off of jar to ensure plenty of fresh air seemed to agree with the larvæ as the increasing quantity of dry

powdery frass at the bottom testified. A month later several very delicate little pearly white moths made their appearance, and destroyed my hope of an *Adela*, but as the habitat of this larva so closely resembles that of an *Adela* larva, I have called it *Adelalis*, although to be properly scientific I suppose it should be called in Latin the "Lichen-feeding-*Adela*-like-case-bearing-almost-invisible-pyralid."

It is placed tentatively in the genus *Symphysa*, as its structure more nearly resembles the species of this genus than any other with which I am familiar, but there are certain differences in the moth as well as entirely different habits of the larvæ which will probably warrant the erection of a new genus if nothing more closely allied than *Symphysa* can be found to accommodate it. The case is from 14 to 16 mm. long, 6 to 7 mm. wide, 2.5 mm. thick in the middle. It is composed of small particles of nearly white lichen, held together with silk, the outside appearance is rough very much resembling the lichen on a fairly smooth piece of bark; the inside is neatly lined with a thin layer of white silk.

The case is bivalvular, the under valve is only two thirds the length of the upper, hence, at each end the latter overlaps the former, giving a space for the larva to stretch head and two or three segments from the closed case and feed in safety, entirely invisible, under the protection afforded by the projecting ends of the upper valve; this item of safety is further enhanced by the way the silk is spun into these ends, causing them to lay with edges flat and pressed to the bark.

The case is begun with a hinge on one side, exactly like a pair of clam shells, and is enlarged by adding to the outer edges and ends. On the under side the concentric rings of slightly different shades of lichen clearly indicate this. In shape the main or protected part of case is roughly oval, but with the extension pieces of the upper valve broadening out equal to its greatest width. Fig. 20 on Plate IX was drawn from an imperfect case, in perfect specimens the outer ends are smoothly and evenly rounded.

The larvæ spend from eight to ten days in pupa. On June 26 about a dozen moths had emerged, while a considerable number of larvæ had not pupated. Only one brood, the moths, no doubt, lay their eggs shortly after emergence, and I believe the eggs hatch and small cases are begun in the fall, the insects wintering in this stage.

Crambus vachellellus, sp. nov. Plate IX, Fig. 6.

Head, palpi and thorax lead color with a slight metallic luster. Fore wing dull lead color, inner two thirds, with a number of nearly black lines; one, beginning at base extends parallel to costa to inner third where it divides for a short distance (about one eighth), then joining again and ending before subterminal band. A second line begins at costa on inner third, runs obliquely outward to band number one but does not touch it, beyond this on costa a third oblique dash. Below band number one beginning at base a fourth band descends obliquely towards anal angle, but stopping before subterminal band, below this band number five runs parallel to number four, number six, somewhat less distinctly defined parallels the last two. In the space beyond and below cell and between bands one and four are three short dashes of same dark color. Between these dashes and also between bands four and five the ground color is replaced by creamy white. The ground color of outer third of wing is bright ochreous, crossed from costa to anal angle by subterminal band of metallic lead color. This is angulated in center same as *hortellus*. An apical dash of metallic and metallic scales on cilia forming a terminal metallic band is also like *hortellus*. The three black dots on lower half of outer margin are also repeated. Hind wings and under side of both wings are dull lead color, cilia shining but not metallic. Abdomen lead color, legs fuscous. Alar expanse 15 to 20 mm.

Size and markings same as *Crambus hortellus* Hbn. but ground color very dark lead grey, instead of pale cinereous as in our eastern specimens of *hortellus*, and while it may prove to be the same species, the constancy of coloration in the long series before me will certainly entitle it to a varietal name.

My species much more closely resembles Meyrick's description of *hortellus* in his Handbook of British Lepidoptera than Fernald's description of this species in his Crambidæ of North America.

Described from forty specimens collected by Arthur H. Vachell, Verdi, Nevada, June 1 to 10, 1903, and I take pleasure in naming it after him. Mr. Vachell advises me that the specimens were all caught in long grass.

Type U. S. Nat. Mus., No. 6969. Cotypes, Am. Mus. Nat. Hist., Acad. Nat. Sciences, British Museum and collection Kearfott.

Thaumatopsis daeckeellus, sp. nov. Plate IX, Fig. 14.

Eyes large, hemispherical, reddish-brown mottled with black, scales between eyes, long, erect, light and dark brown mottled, same coloration extending over thorax, base of antennæ circled by a ring of cream-colored scales. Palpi long as head and thorax, pointed; long scales mottled ochreous fuscous and dark brown. Antennæ half as long as front wing, pectinated, dark fuscous. Front wing ochreous fuscous, almost uniformly distributed over wing, except above median line ground color is a shade or two darker. Conspicuously marked with a narrow white band on median line beginning at base, clearly defined and distinct to end of cell, then gradually turn-

ing to light brown (approximating ground color of wing) and continuing to outer margin. No other lines or dashes. Cilia short, uniform with ground color. Hind wing dark fuscous. Underside both wings dark fuscous. Abdomen dark fuscous, terminal tuft shade lighter. Legs dark fuscous. Alar expanse 20 to 23 mm.

Described from five males, Lucaston, N. J., October 10, 1902. Collected by E. Daecke in whose honor I take pleasure in naming this very distinctive species. Mr. Daecke states that on October 10 the grass was fairly alive with specimens of this species, and as it seemed so common he thought the few he caught would be sufficient for all of his needs.

Zelleria celastrusella, sp. nov. Plate IX, Fig. 1.

Head: frontal tuft of long, overhanging, light gray scales, finely specked with brown, and over the eyes forming rounded tufts, out of which the antennæ arise. Palpi porrect, one and a half length of head, second and apical joint about equal in length, both tufted, the apical joint ending in a large rounded tuft, scales same color as on head. Eyes black. Antennæ: basal joint slightly thickened beneath, color fuscous, more whitish on upper side of basal joints, and at incisions, length three quarters of forewing. Thorax: rather closely appressed scales, whitish with fuscous spots caused by tips of scales being so marked. Patagia long, appressed scales, same color as thorax. Forewing: fuscous, with loosely appressed scales, about twenty single long, black scales form as many black dots, four on costa before the middle, two just below costa beyond the middle and two on costa before the apex, others are about evenly distributed over the dorsal half of wing, a lighter shade crosses wing at inner fourth bordered outwardly by a much darker patch, which is broadest just below costa, and curves inwardly to a narrow band on dorsum. A distinct patch of white scales form a spot on costa before apex, just at the beginning of the cilia, another patch of white scales on outer margin between apex and outer angle, between these white patches is a median shade of yellowish fuscous, beyond this shade and the white spots the cilia is inwardly margined with black, cilia before apex ferruginous, a shade of pearly white scales on cilia below lower white spot. A streak of lighter ground color from base to angle between median and dorsal. Underside dark fuscous, nearly black at apex. A costal white line on the outer half, ending in a white costal spot beneath the subapical spot on upper side. Cilia paler. A long pencil of dark fuscous hairs arise at base and lay along costa. Hind wing: upper and under side uniformly dark fuscous, cilia paler. Abdomen fuscous, speckled with lighter scales. Legs same as head and palpi. Alar expanse 13 to 16 mm.

Described from about 200 bred specimens, Essex County, New Jersey, larvæ on *Celastrus scandens* Linn. (climbing bittersweet). Type U. S. Nat. Mus., no. 6817. Cotypes, Am. Mus. Nat. Hist., Acad. Nat. Sciences, British Museum and collection Kearfott.

Larva.—Mature, 9–10 mm. long, slender, tapering evenly to each end, slightly annulate, width widest part middle segments 1.5 mm.; width head .45 mm. Head olive greenish-brown, mouth parts light brown, ocelli black; slightly flattened, in-

dented at top, lobes full and rounded. Clypeus triangular, reaching only half way to vertex. Thoracic legs yellowish-green; abdominal legs normal, complete crochets of brown hooks. Skin vivid leaf green, slightly darker dorsal line and ventral surface paler. Anal prolegs long, projecting back beyond anus. No lines or marks on skin. Thoracic shield concolorous, but shining, tubercular plates concolorous and inconspicuous. Spiracles minute, concolorous. Tubercle i at same height as ii, iii directly dorsad to spiracle, iv caudad and ventrad to spiracle. Thorax ia + ib, iia + iib. Setæ short and very slender, tubercles minute.

Pupa.—From empty pupal skin; very thin and flimsy. Length 5.5 mm. Wing and antennal cases extend down to extreme end of anal segment, the latter a trifle beyond as two blunt points. Cremaster small, very slightly indented, armed with two short hairs, each terminating in a small recurved hook. Labial palpi about half length of wing cases and swelling out to twice its average width, at about one third below labrum. Just below eye cap, on each side between labial palpi and prothoracic feet cases, is a slightly indented oblique suture forming a small triangular space that perhaps indicates the position of the maxillary palpi. Dehiscence, the ventral edge of antennal cases on one side separate from prothoracic foot, and on the other side the lateral edge of antennal case separated from wing case for about half their length. Part of vertex of head, clypeus, labrum and about half of eye-caps remain cemented to labial palpi.

Early in May the terminal twigs and almost every leaf of this vine is crumpled and spun together by these slender green larvæ, each living separately. Pupated from May 15 to 20 and moths began emerging May 27, continuing until middle of June. I have not found any trace of a second brood. The larvæ pupate within the crumpled leaf, spinning a dense spider-web mass of white, silk, pupa remains in cocoon when moth emerges. The moths have a distinctive resting habit; the legs are drawn up close to thorax and latter is pressed down so that the ventral side touches the twig, the wings are pressed tightly against abdomen and tilted up, at an angle of fifteen to twenty degrees from the level of the surface on which they are resting. In this position they can readily be mistaken for a well-developed bud, as their general color is not unlike the bark of the vine.

Recurvaria.

During the early spring of 1902 and 1903 I succeeded in breeding moths of this genus from four different species of conifera, and after having done so found I was able to clear up a case of wrong identification with regard to one of the species.

In the Fifth Report of the U. S. Entomological Commission, page 850, Fig. 284 is labelled *Gelechia obliquistrigella* Cham. The type of *obliquistrigella* which Mr. Busck has examined at Cambridge and the

U. S. National Museum is an entirely different species. Therefore, Fig. 284 represents a species until now undescribed and which I propose to call *piceaella* after its food plant, red spruce in New England and black spruce in Northern New Jersey.

Very closely allied to this species, and difficult to separate in the perfect state, except for its average smaller size is a species that feeds on *Thuja occidentalis* Linn. (arbor-vitæ or white cedar), this species I have named *thujaella*.

On *Juniperus virginiana* Linn. (red cedar) I have bred what I believe to be the true *obliquistrigella* of Chambers.

On *Juniperus communis* Linn. (common juniper) is a fourth species closely allied to the last, which I have named *juniperella*.

Two additional species were also bred on conifera which, having similar larval habits, may be included in the following brief synopses.

On *Pinus rigida* Mill. (common pitch pine) the larvæ of *Paralechia pinifoliella* Cham. are common throughout northern New Jersey.

On account of its larval habits I am inclined to place this species under the genus *Recurvaria*, but refrain owing to a strong protest from my friend Busck whose opinion on the general subject and especially generic distinctions I have much respect for; although I am not convinced that he is entirely right in placing *pinifoliella* — a miner of pine needles and our old friend *inscripta* Wlsm. (but hereafter to be known as *cristifasciella* Cham.), whose larva lives on oak, between two leaves fastened together with silk, both together in his new genus *Paralechia;* and while the venation of these two species may be identical, their appearance, in outline, coloration and general superficial characters, as well as their habits, are very different.

On *Tsuga canadensis* Linn. (common hemlock), *Recurvaria apicitripunctella* Clem. (*abietisella* Pack.) are common as larvæ in March and April in North Jersey.

The five first-named species are distinctly miners, excavating and living within the leaflets or needles; I was somewhat doubtful about this being the case with the two juniper species, as juniper leaflets are very much contracted at the joints, but careful examination with a lens proved that narrowed as they are they are hollowed out in exactly the same fashion as by the feeders on the long leaf pine and shorter leaf spruce.

The leaf of the hemlock is so very flat it is very doubtful if the larvæ excavate, at least in their later stages.

I have observed one habit common to all six species. Their eggs are laid within a reasonable time after the moths' emergence (June and July), in due course the young larvæ hatch and begin a very minute mine (the hemlock species I have not observed in its earliest stage), which is slowly enlarged until cold weather causes torpidity, and the larvæ remain in these original mines until the earliest sunny and warm spring days, when they desert the old mines and begin new ones (in previous season's leaves) usually farther out or nearer the end of the twig. One pitch pine needle is sufficient to complete the larva's growth; on spruce several are required and the holes in the bases of these are connected together with slender tubes of silk, the larva passing from one to another at will, and it may often be seen in the tube, between two needles, seemingly enjoying the warmth of a sunny day.

The above-named moths can be separated by the following synopsis.

SYNOPSIS OF SPECIES.

1. Forewing with whitish band from base to outer margin, parallel to costa..... 2
   Forewings without this band..... 3
2. Subcostal band on forewing continuous..... **juniperella.**
   This band interrupted about one third from apex..... **obliquistrigella.**
3. Forewing with three oblique costal dashes..... 4
   Forewing without these dashes..... 5
4. Forewing grayish fuscous..... **thujaella.**
   Forewing ochreous fuscous..... **piceaella.**
5. Forewing with three white vertical bands from costa to dorsum..... **pinifoliella.**
   Forewings amber color, an oblique white streak from middle of costa. **apicitripunctella.**

The following synopsis will indicate the principal differences in the larvæ; the most similar pair of moths *thujaella* and *piceaella* are very distinct in the larvæ. All comparisons are from mature larvæ.

SYNOPSIS OF LARVÆ.

1. Head and prothoracic shield very dark brown, almost black..... 2
   Head and shield light brown..... 3
2. Skin green..... **apicitripunctella.**
   Skin brown..... **pinifoliella.**
   Skin red..... **thujaella.**
3. An open red square on abdominal segments confined to dorsal region **obliquistrigella.**
   These squares extending to below spiracles..... **juniperella.**
   Red predominating on dorsal and lateral regions..... **piceaella.**

Recurvaria thujaella, sp. nov. Plate IX, Figs. 8 and 21.

Head cream white, closely appressed scales. Palpi long, twice length of head, descending, curved; cream white, basal joint black, and a black streak on under side of middle joint from base to half its length; a narrow ring of black on terminal joint near base and another just before apex. Antennæ: length two thirds of forewing; basal joint dark brown, without pecten, balance grayish-white with black annulations at incisions. Thorax and patagia cream white. Forewing cream white; three outwardly oblique, roughly triangular, black costal patches, all edged outwardly with whitish scales; the inner begins at base and extends nearly to dorsum, the middle patch at inner third and the outer at outer third are both smaller and reach only to median line; with a denser cluster of black raised scales at lower apex of each forming a distinct black dot; below each, close to dorsum is a small black dot; close to costa between basal and middle patch is a sixth black dot, these six dots are in three vertical pairs, almost evenly spaced and are all formed of black raised scales bordered by one or two pure white scales. The outer patch is bordered by a white line from costa, curving obliquely outward to middle of wing and then obliquely inward to dorsum. Beyond this white line on costa is a patch of ground color more or less evenly overlaid with dark brown scales, beyond this on outer margin is a wide band of blackish-brown and a paler streak at extreme outer edge. On costa before apex are three small black dots, also one at apex, one on outer margin close to apex and one close to outer angle, these six spots are of black raised scales with one or two white scales bordering each; the apical spot is narrowly ringed with ground color, this ring is bordered by darker scales, these scales being condensed into a fine semicircular line on extreme apical margin, the whole forming a clearly defined apical ocellus. Cilia above apex, short, ground color heavily overlaid with black, below apex longer and less overlaid with black, on inner margin light gray and as long as width of wing. Cilia indented at inner angle. Under side smoky gray, a pale whitish narrow shade along costa at outer third and several lighter shades on costa before apex. Cilia much paler, especially along outer margin where it sharply contrasts with dark gray of wing; this lighter shade turns the corner of the apex. Hind wing light gray; cilia same, about one and a quarter as long as width of wing. Under side same, but slightly darker. Abdomen creamy white, under side shaded with brown at anterior and middle segments. Legs creamy white, each joint ringed or shaded with dark brown. Alar expanse 8.5 to 10 mm.

Described from forty-two specimens, bred from *Thuja occidentalis*, Linn., the common arbor-vitæ used extensively for hedges, and also known as white cedar when allowed to grow into trees.

Type U. S. Nat. Mus., No. 6964. Cotypes, Am. Mus. Nat. Hist., Acad. Nat. Sci., British Museum and collection Kearfott.

Larva. — Slender cylindrical, tapering only close to ends, slightly annulate, length 7.5 mm. Width central segments, 1 mm. Width head .5 mm. Head jet black, narrow pointed, scarcely indented at apex, lobes rounded, clypeus narrow, triangular, reaching to within one third of vertex. Prothoracic shield dark brown nearly black bisected by a faint green line and separated from head by a narrow green collar. Anal shield small, black. Thoracic feet black-brown; abdominal feet

normal, hooks brown in small complete crochets. Skin dull red, slightly tinged with purple, greenish in incisions between segments pink on ventral surface.

Pupa.—From empty pupal shell. Length 4.5 mm., slender, cylindrical, tapering evenly to anal end, which is rounded, not pointed, and armed with two short recurved hairs. Wings and antennæ extend down to posterior edge of fifth abdominal segment. Labial palpi slender, tapering evenly to almost a point and half as long as wings. Vertex of head rounded and smooth, eyes rounded, moderate, prominent. Dehiscence accomplished by labial palpi, to which is attached labrum, clypeus, and eye caps, separating from prothoracic feet covers, on one side the split extends down to lower end of palpi. On dorsal line the split extends length of thorax. Pupa remains in cocoon when moth emerges.

The eggs are deposited in the summer, and young larvæ begin mining in the preceding year's leaves, avoiding the tender and resinous young leaves of the present year; they are probably more than half grown by fall and hibernate in this stage. In the very early spring, late February and early March, on warm sunny days the larvæ can be seen travelling a few inches farther out the twig and starting a fresh mine, this time in the growth that was new their first year.

The interior of the peculiar close-jointed leaves, is completely excavated, causing the empty leaves to turn yellow, and these small patches are easily seen as contrasted with the natural dark green foliage (Plate IX, Fig. 21, enlarged). When ready to pupate the larva lines one of the leaflets with white silk, making a roomy little cell and begins pupating latter part of May, first moths emerged June 7, and continue during June.

A few hymenopterous parasites were bred, issuing about the same time as the moths, which Dr. Ashmead describes as new in this number of the Journal (p. 144) under the name of *Protapanteles recurvariæ* Ashm.

Recurvaria piceaella, sp. nov. Plate IX, Figs. 10 and 19.

Markings same as *thujaella*, except the light shades have an ochreous tone rather than fuscous as in *thujaella*. The average size of *piceaella* is about 1 mm. greater than of *piceaella*. Otherwise, the two species are very difficult to separate in the imago state, and my only justification in making two species is in the considerable difference in the larvæ and their food plants. Alar expanse, 9.5 to 11.5 mm.

Described from fourteen specimens bred from black spruce, *Picea mariana* Mill., Montclair, N. J. Issued May 30 to June 18, 1903. Type, U. S. Nat. Mus., No. 6962. Cotypes Am. Mus. Nat. Hist., and collection Kearfott.

Larva. — Same shape as larva of *thujaella*, but instead of black the head is pale brown, prothoracic shield same but lighter. Skin red on dorsal, lateral and ventral

regions, a dark green patch on each abdominal segment, on central dorsal area. On ventral surface of thoracic segments, between each pair of legs is a deep purplish red spot; on segments 5 and 6 there is one such spot on each segment on center line.

This species is so well represented by Fig. 284, page 850 of the Fifth Report of the United States Entomological Commission, that a detailed description is hardly necessary. Dr. Packard states that the alar expanse of the specimens before him was 13 mm. I have not bred or seen any specimens exceeding 11.5 mm.

Parasites: *Protapanteles recurvariæ* Ashm., same as above.

From the same batch of larvæ from which the above issued were bred three almost black specimens which, below, I have given the varietal name of *nigra*.

Recurvaria piceaella var **nigra,** var. nov. Plate IX, Fig. 9.

Face cream white, slightly irrorated with smoky brown, scales closely appressed, vertex same but smoky brown predominates. Palpi long, curved upwards, outer end of second joint enlarged, apical joint about half as long as second, obtusely pointed. Color inside and top of second joint cream white, underside fuscous, irrorated with black, outside dark brown, nearly black, with two small spots of creamy white on inner end and a large white spot at outer end. Outer joint a white annulation at base, center and apex, between these are two rings of blackish-brown. Antennæ: basal joint black, slightly enlarged, about three fifths length of front wing, annulated with cream white and fuscous. Thorax shiny fuscous, irrorated with brown scales. Fore wing: color dark brown, nearly black on costa, evenly shading to a few degrees lighter on dorsum. Marked by three conspicuous oblique white costal spots, evenly spaced, first at inner fourth, second about center and outer at apical third. A black spot close to costa beyond first white spot and two black spots below it, one on median line and one close to dorsum, both outwardly edged with white. Below middle white costal spot is a smaller white spot on median line, below this but slightly towards base is another black spot edged outwardly with white. A larger black spot close to dorsum at outer two thirds, edged with white costad, and a smaller black spot just above it, this latter has a white scale on each side dorsad. The outer white costal spot extends obliquely to median line, then proceeds at right angles inwardly to dorsum, forming a >, beyond this the ground color is dark fuscous, heavily overlaid with black scales, and with three small median spots of white in a line parallel to costa before apex, and one just above anal angle on outer margin. Cilia dark fuscous, inside light fuscous. Hind wing very dark fuscous, cilia paler, underside of both wings same. Abdomen dark fuscous, anal tuft dark cream. Legs fuscous, annulated with cream color. Alar expanse 10 mm.

Three specimens bred from *picea mariana* Mill. Type U. S. Nat. Mus., No. 6963. Cotypes Am. Mus. Nat. Hist. and collection Kearfott.

Recurvaria juniperella, sp. nov. Plate IX, Figs. 3 and 17.

Head creamy ochreous white, closely appressed scales. Palpi long, second joint thickened with appressed scales, third joint nearly as long as second, slender, bluntly pointed, slightly drooping, curved outward and upward; color cream white, with dark brown or blackish scales on basal joint, on under side and extending upwards in two patches on outer side of middle joint, forming basal ring and a short streak on under side of terminal joint, this last streak joining a subapical ring. Antennæ: basal joint without pecten, whitish clouded with brown, other joints with annulations of white and brown, about two thirds length of forewing. Thorax creamy white, less ochreous than head, irrorated with light brown. Forewing: creamy white, a sharply defined narrow band of black raised scales sightly and evenly curved from base along median line to apex of wing, at base this black band extends to costa to one eighth; above this band the ground color is more of a pearly white, and forms a distinct whitish streak; on costa at inner third is a short line of black and at outer third a longer line of black, the latter broadening at outer end into a triangular patch almost reaching median band. Four almost evenly spaced dots of black raised scales parallel to and about midway between median bands and inner margin, a fifth dot vertically above the outer on the costal edge of the median band. Three other dots in a line along outer margin; all of the dots are of black raised scales bordered by one or two white scales. Cilia at apex and outer margin mottled with dark brown, at inner margin pale gray. Under side brownish-gray, darker along costa and at apex. Hindwing: upper and under sides pale gray. Abdomen creamy white, darker beneath. Legs creamy white, streaked and spotted with reddish-black, the latter color predominating on first pair, only the incisions are white. Alar expanse 9.5 mm.

Thirteen bred specimens on *Juniperus communis* Linn., Essex Co., N. J.

Type U. S. Nat. Mus., No. 6965. Cotypes, Am. Mus. Nat. Hist., and collection Kearfott.

Larva.— Slender, cylindrical, slightly and evenly tapering to each end, 5–6 mm. long, 9 mm. extended. Width widest part 1.3 mm. Width head .55 mm. Head high or long, slightly flattened on face, slightly bilobed at top, lobes small and rather acutely rounded. Clypeus triangular, to within one third of vertex, narrow. Color, head light brown, mouth parts darker, ocelli black, antennæ very short. Prothoracic shield concolorous with head, size moderate, to subdorsal line. Thoracic legs light greenish-brown, abdominal legs normal, hooks yellow in complete crochets. Skin pale dull green, tinged with dull pink laterally on dorsum and on posterior edges each segment, and a double pink line across the anterior edge of each abdominal segment. The pink shading is concentrated into oblique dashes behind and below the spiracles. Ventral surface paler green. Tubercular plates inconspicuous, setæ weak and short.

Pupa.—From empty pupal skins. Length 3.8 mm. Slender, slightly flattened tapering evenly to end of anal segment, which is rounded smoothly with no trace of a cremaster, armed with a dozen or more very short fine hairs, with small recurved hooks on their tip ends, on dorsal and ventral surfaces, principally on former; later-

ally on each abdominal segment is a minute spur and minute stiff hair, to assist pupa to make its way to hole prepared for emergence of moth. Wing cases half way overlap sixth abdominal segment, labial palpi, half length of wing covers, are slender, very slightly enlarged at one third. I do not recognize any indentation or marks indicating maxillary palpi. Dehiscence: labial palpi separated on both sides for its entire length except lower end, from the prothoracic feet, the antennal cases are laid between the metathoracic feet and wing covers. To the labial palpi are attached the labrum, clypeus, a small part of the vertex of head and inner half of eye cap. Apparently segments six and seven are free.

A new hymenopterous parasite was bred from this species, described in this number of the Journal (p. 144) as *Orgilus kearfotti* Ashm.

Gnorimoschema busckiella, sp. nov. Plate IX, Figs. 7 and 8.

Head: cream white, loosely appressed scales, irrorated with bronze-brown. Palpi: long, drooping, curved, twice length of head, upper, inner surface of second joint and basal half of third joint same as head, outer and under side the brown predominates, with a few specks of white; apical half of third joint, brown predominates, same as under side. Second joint tufted on under side, outer edge dentate, apical joint half length second, slender, slightly rough beneath, pointed. Antennæ two thirds length of forewing, basal joint slightly larger than next, bronze-brown speckled with white, outer joints alternate rings of bronze-brown and white. Thorax and fore wings bronze-brown, irrorated with white, the basal half of each scale is white, outer and overlapping half bronze-brown, the white irrorations are caused by the brown not entirely covering the basal white. This arrangement of scales is uniformly distributed over the wing, except on the costal margin outer quarter and outer margin, where on account of the greater length of the scales, more white is exposed and the colors are almost equal. On the outer margin the same coloration extends half way out on the cilia. Underside dull brown, with a very faint wave-like whitish irroration, more distinct at apex. Hind-wing: both upper- and underside and cilia fuscous. Abdomen: bronze-brown, irrorated with whitish-brown at incisions on upper side, and over entire under surface, tufts of whitish-brown scales along each side. Legs: same ground color, with small specks of whitish-brown, with an almost white annulation at each incision: Average alar expanse 16 to 19 mm., one specimen only 11 mm.

Fifty-five specimens bred from larvæ forming a peculiar gall on the lateral shoots of *Aster patens* Ait., from Caldwell, N. J., issued during October. Type U. S. Nat. Mus., No. 6818, and Cotypes Am. Mus. Nat. Hist., Acad. Nat. Sci., British Museum and collection Kearfott.

Larva. — Cylindrical, robust, tapering only at extreme ends, length 10 mm., width abdominal segments 2 mm., width head .8 mm. Head small, rounded, bilobed, color dark brown, paler on front of lobes, clypeus narrow, evenly triangular, reaching to apex; paraclypeal pieces dark brown; ocelli black, antennæ moderate, basal segment whitish. Prothoracic shield a darker shade of yellow than skin, triangular, bisected by paler dorsal line, anal shield same, very narrow and small, neither chit-

inous. Thoracic feet concolorous, a small triangular brown spot cephalad and ventrad to each. Abdominal feet normal, small crochets of hooks complete, in minute circles. Skin uniformly pale yellow, dorsal line and anal segments smoky yellow, from food visible through clear skin. Spiracles minute, concolorous. Tubercular plates obsolete, tubercles very minute, setæ short and very minute, pale yellow.

Pupa.—From empty pupal skin: length 7 to 8 mm., width 1.8 mm. to 2 mm. Shape cylindrical, gradually tapering from thorax to anal segment, emergence affected by a split on dorsal line to and through mesothorax, on ventral surface the separation occurs on outside edge of one eye piece, and almost an even line to base of labial palpi, the latter is separated from adjoining tissue but remains attached at base. Wing cases, antennæ, and metathoracic feet extend down to posterior edge of seventh abdominal segment. Labial palpi to posterior edge of third abdominal segment. Eye-covers very small, clypeus small, narrow triangular at lower edge where it joins labrum. I cannot make out a distinct suture defining maxillary palpi. Anal segment terminates in an obtuse point, no defined cremaster or hooks, both dorsal and ventral surfaces are evenly smooth, free from deep sutures or hooks and setæ are so short as to be invisible under a lens of moderate power.

Late in August, last year, I noticed in a swampy meadow near Caldwell, N. J., a large proportion of the common late purple aster (*Aster patens* Ait.) with their lateral twigs or branches dwarfed in a peculiar manner (Plate IX, Fig. 18, enlarged), and on investigation found each of these twigs to contain a lepidopterous pupa.

This year, I have made almost weekly examinations of the plants, and not until late in July were the larvæ found, apparently nearly full grown as they began pupating the first week in August.

A moth was caught on a warm day late in November, having been beaten up from its resting place close to or almost on the ground.

Another peculiarity in connection with the life-history of this species is that it seems to be partially dependent upon the habits of another insect to prepare its habitat. Each of the Aster plants on which *busckiella* larvæ or pupæ were found in the lateral stems, were tenanted in the main or central stem by a single larva of *Thiodia radiatana* Wlsm., a large Tortricid. This larva makes a long burrow or excavation, three or four inches long, open at the top, destroying the central bud; thus the plant, pruned at the top, immediately starts a vigorous growth of laterals. On some plants as many as a dozen were found, each tenanted by *busckiella*. The Tortricid larva remains in the stem throughout the winter, deserting it late in March or early April and pupates on the ground, in a closely spun brown cocoon among the dried grass, leaves, etc.

The life cycle of *busckiella* then appears to be: Hibernation in the perfect state, eggs laid during June, after *radiatana* has dwarfed the

plant and thereby started many tender lateral twigs, larvæ full grown and pupated early in August and moths emerging during September and early October.

The effect produced by the larva of this species on the aster twig, is to hinder its growth at its outer ends, causing the leaves to be closely crowded together, and closely massed somewhat like a wide-open cone of hemlock or spruce. The stem, for about two inches of its outer length is also swelled to about twice the diameter of the portion of the stem below the gall. There is no opening at all in this cell, during the larval period, but just before pupation a hole large enough for moth to crawl out is cut in the upper portion, but not entirely through. The thin outer skin is left intact to be broken by the moth. So the frass cannot be ejected, and as but a thin dark layer is found in the lower end of the cell, I am inclined to think that the greater part of the excretion is absorbed in the live and growing tissue of the plant.

I have observed the same state of affairs in the large plum-like galls on goldenrod of *Gnorimoschema gallæsolidaginis* Riley. The query arises: Are not the galls produced by the absorption into the cells of the plant, of this unaccustomed liquid rather than by any mechanical action caused by the larva eating? It would not be difficult to learn something more about this, by the use of a hypodermic syringe, to inject the liquid squeezed from a few pellets of frass into the soft tissues of various perennial or other plants.

The moth emerges from pupa within the cell, leaving the empty pupal shell within.

Gnorimoschema artemisiella, sp. nov. Plate IX, Fig. 5.

Head, thorax and palpi grayish-white, irrorated with darker scales, face white. Second joint palpi thickened, outer joint two thirds length of second with a basal and subapical band of brown scales, patagia terra-cotta. Antennæ two thirds length forewing, basal joint mottled, outer joints annulated light gray and black. Forewing ochreous, pink, or terra-cotta, heavily overlaid with streaks and bands of mottled gray and black, running parallel to costa. The costa is narrowly edged with this secondary color, a streak from base along median line curving into costa at one half; this color also predominates along inner margin. On apical third the black and gray dots are formed into narrow streaks or dashes radiating to outer edge and extending over cilia. There are three small black dots of raised scales, one on costa at inner fourth, one in cell just before outer end and one on median line beyond cell. There is a considerable degree in variation in different specimens, some are so heavily overlaid with the secondary color that the ground color is reduced to three narrow streaks, one just below costa, one along median line and the lower one in fold, these only extending to end of cell with just a bare indication of

the ground color on the outer half between the nearly parallel radiating lines of the secondary color. In other specimens the ground color occupies more than half of the inner half and extending down to inner margin. Underside fuscous with secondary color on apical cilia. Hindwingsl ight gray, cilia fuscous, under side same. Abdomen: upper side terra-cotta, but more ochreous than on forewing; anal segment grayish-white, underside pearly white, a double row of black dashes on either side of segments 6 to 9. Legs same color as underside of abdomen, tinged and mottled with brownish black. Alar expanse 9 to 11 mm.

Described from twenty-four specimens bred from *Artemisia Canadensis* Michx., received in June, 1902 and 1903, from my friend Mr. Jos. H. Reading, of Chicago. I also have one specimen of what is no doubt this same species, collected by Dr. R. E. Kunze, July, 1900, Pinal Mountains, Arizona; Mr. Busck advises me that in the U. S. National Museum are specimens of this same species, unnamed, bred by Miss Murtfeldt on *Astemisia*, from St. Louis; indicating a rather extensive range. Type U. S. Nat. Mus., No. 6816. Cotypes Am. Mus. Nat. Hist., Acad. Nat. Sci., British Museum and collection Kearfott.

Larva.—Cylindrical, slender, tapering evenly from 7 to anal segment, annulate. Length 8 mm. Width 1 mm. Head .6 mm. Head small, rounded, slightly bilobed, clypeus evenly triangular, extending nearly to apex. Ocelli black, antennæ minute. Head yellowish-brown, retractile under 2. Prothoracic shield moderate, triangular, mottled brown, bisected by paler dorsal line, and an almost black spot each side of dorsal line on posterior edge. Anal shield pale yellowish-green, small, shining but not chitinous. Thoracic feet clear yellowish-green, tipped with brown; abdominal feet normal, small, circles complete. Skin dull sordid green, not shining. Tubercular plates not developed, tubercles small black raised points, no other marks except discoloration from food showing through dorsal area. Setæ very weak and minute.

Pupa.—Length 5 mm., width across thorax 1.5 mm., very slightly flattened. Surface generally smooth, tapering gradually to blunt point end of anal segment, which is armed with a radiating zone of very minute stiff hairs before the apex. Vertex of head and upper part of clypeus full, rounded, and extending up above the eye cases, latter small, round, prominent and well defined. Beneath the eyes, on each side of labrum, is a small raised process consisting of a parallel pair of narrow short elevations, which may indicate the maxillary palpi. Labial palpi broadened out about the middle of its length and terminates just before the prothoracic feet, about one half length of wing cases. Latter with antennæ cover fifth abdominal segment. Dehiscence: Pupal skin is very flimsy and fragile and difficult to rescue without fracture from its cocoon, but there appears to be one long break on each side of labial palpi, this organ remains attached at posterior end, and remains united to labrum and clypeus. The cap on vertex of head and eye covers are entirely separated; antennal cases remain attached to wing covers.

The terminal leaves of this plant resemble a long silvery green

tassel, composed of a thick mass of velvety needle-like leaves. This tassel is webbed together by a small green larva, that partially excavates the tip of the twig and feeds close to the bases of the leaves.

The majority had pupated by the first of July in a tough compact little cocoon well hidden in the mass; the first moth issued July 3 and continued until July 17.

Three different species of hymenopterous parasites were bred from this species, namely, *Iseropus inquisitor* Say, *Temelucha nartii* Ashm., *Protapanteles cacœciæ* Riley.

Anacampsis coverdalella, sp. nov. Plate IX, Fig. 13.

Head: closely appressed scales, thorax dark purplish-brown. Palpi same color, slender, long pointed. Antennæ: basal two fifths same color, outer three fifths canary yellow, length four fifths of wing. Front wing: base from costa to inner margin dark purplish-brown, from base to outer fourth canary yellow, outer fourth same as base and thorax — both division lines vertical from costa to inner margin, slightly serrate. The yellow color along costa a shade paler than below median line. Cilia very short, unicolorous with adjacent portion of wing. Underside brownish fuscous shading into darker gray fuscous beyond outer third; a small basal costal patch of nearly black purple brown. Hind wing fuscous, cilia slightly paler and as long as breadth of wing; underside the same. Abdomen: first two abdominal segments canary yellow, others purplish-brown, same as thorax. Underside fuscous. Legs fuscous, tarsi and spurs purplish-brown, nearly black. Alar expanse 11.5 mm.

Specimens collected by George Coverdale, Natchitoches Parish, La., after whom I take pleasure in naming this distinctively marked species. Type U. S. Nat. Mus., No. 6967. Cotype collection Kearfott.

Epimenia

Epimenia cicutaella, sp. nov. Plate IX, Figs. 12, 15 and 16.

Head: closely appressed scales, fuscous, each scale tipped with a minute dot of brown — making a finely speckled appearance. Thorax and patagia the same, but the latter a darker fuscous. Labial palpi long, recurved, apical joint about half second, thickened with loose scales, rather obtuse; yellowish fuscous inside, lower edge tipped with dark brown; outside same but much darker, apical joint dark brown, with minute yellowish specks. A narrow ring of yellow on middle joint at outer end. Antennæ about three quarter length forewing, basal joints slightly enlarged, dark brown, outer joints ringed with brown and pale gray. Forewing creamy white, irrorated with brown and black dots. The brown color is massed into a smoky brown shade on and parallel to costa beginning just before half and extending to outer two thirds, the shade is darkest brown along median line, its inner edge extends obliquely to inner margin and is there accentuated by largest dentate pencil of scales referred to below; the lower edge of shade is sharply defined by paler ground color, just below median line, somewhat reniform, with inner lobe twice length of outer. Beyond this in apical third along median line is another smoky brown shade longer than wide, and a very small one just beyond base on median line. At base of wing is

a short median dash of black. The costa is also marked with about eight small clusters of black scales irregularly spaced. The inner margin is strongly dentate by four clusters of long scales, whitish at base and tipped with black; the largest cluster at inner third, the outer three evenly spaced within the middle third; a small black spot between two brown shades, on median line at outer two thirds and another black spot on outer margin just below apex. Cilia pale fuscous, more than the width of wing, on outer margin long wing scales project into cilia forming a smoky line bounded inwardly by ground color and outwardly by pale fuscous and extreme edge beyond that smoky fuscous, at apex the cilia is uniformly dark, forming a hook-like termination to wing. Underside dull fuscous. Hindwing, upper- and underside bright silvery fuscous. Cilia very long, three to four times wings' width. Abdomen and legs fuscous, latter banded with very dark brown. Alar expanse 13 to 14.5 mm.

Forty specimens bred from larvæ on flower heads of *Cicuta maculata* Linn., water hemlock, Essex County, N. J. Type U. S. Nat. Mus., No. 6815. Cotypes Am. Mus. Nat. Hist., Acad. Nat. Sci., British Museum and collection Kearfott.

Larva.— Mature 6.5 mm., robust, cylindrical, slightly tapering, width 1 mm. Width head .6 mm. Head very pale brown, clypeus evenly triangular, reaching nearly to vertex; slightly bilobed, lobes full and rounded. Mouth parts dark brown, antennæ moderate, pale green, except outer joint brown. Ocelli on black field. Prothoracic shield, all of dorsal region, bisected by a narrow yellowish line, same color as tubercular plates. Anal shield small, narrow, not chitinous. Thoracic feet black, greenish-yellow at articulations. Abdominal feet normal, hooks very dark brown in complete circles, not open. Skin creamy white, broad subdorsal band of a smoky brown or pale grayish-brown from segment 3 to anal segment, involving tubercles i and ii. These bands are continuous from 5, and on 3 and 4 are interrupted between tubercular plates. The latter on thorax and abdomen are large and same color as subdorsal bands, but a shade darker. Tubercles i and ii normal, iii dorsad and cephalad to spiracle iv + v. On thorax ia + ib, iia + iib, iv + v. Setæ moderate, very dark nearly black. Spiracles small, round, very dark brown.

Pupa.—Nearly cylindrical to ends of wing cases, then evenly tapering to apex. Length 5 to 6 mm.; diameter 1 mm. Cremaster long, narrow, armed with about a dozen short hairs, each terminating in a strong recurved hook, all pointing backwards. Vertex of head full, rounded, smooth, and much paler in color than balance of pupa, eye cases small, rounded, labrum small, labial palpi widens to double width of labrum at one third below it, and extends down two thirds length of wing-covers. Antennæ and wing cases cover seventh abdominal segment, organs on frontal piece well defined, sutures deep. A lateral spine on abdominal segments 4 to 7. Color of pupa, except vertex of head, very dark brown, nearly black on dorsum. Dehiscence: A long separation between antennal cases and labial palpi, on each side of latter and extending two thirds their length; labrum and clypeal piece remain attached to labial palpi; half of eye cap attached to wing cover. Antennæ remain cemented to wing covers on lateral edges.

Miss Murtfeldt* described an *Epimenia* which she bred from

*Can. Ent., XXXII, 162, 1900.

Pimpinella integerrima Linn., a plant closely allied to *Cicuta;* I have compared my species with specimens of *Pimpinella* Murtf., in the U. S. National Museum and there is no doubt they are distinct.

The food-habits are also different. My species lives on the flower heads of *Cicuta maculata* Linn., and when the seeds are formed it excavates their contents (Plate IX, Fig. 16, enlarged). In fact the majority of larvæ found are more than half buried in a seed. Although carefully examined a number of times before the seeds formed, I was unable to find any indication on the leaves that the larvæ had at any time mined them. When ready to pupate the larva makes brown silk open-mesh cocoon, invariably spun either on the upper or under side of the seed heads, between the radiating stems on which the seeds are borne.

My species is very similar to but quite distinct from the European *E. chærophyllella* Gz.*

Larvæ mature and begin pupating first week of August. Moths emerge August 18 to 27.

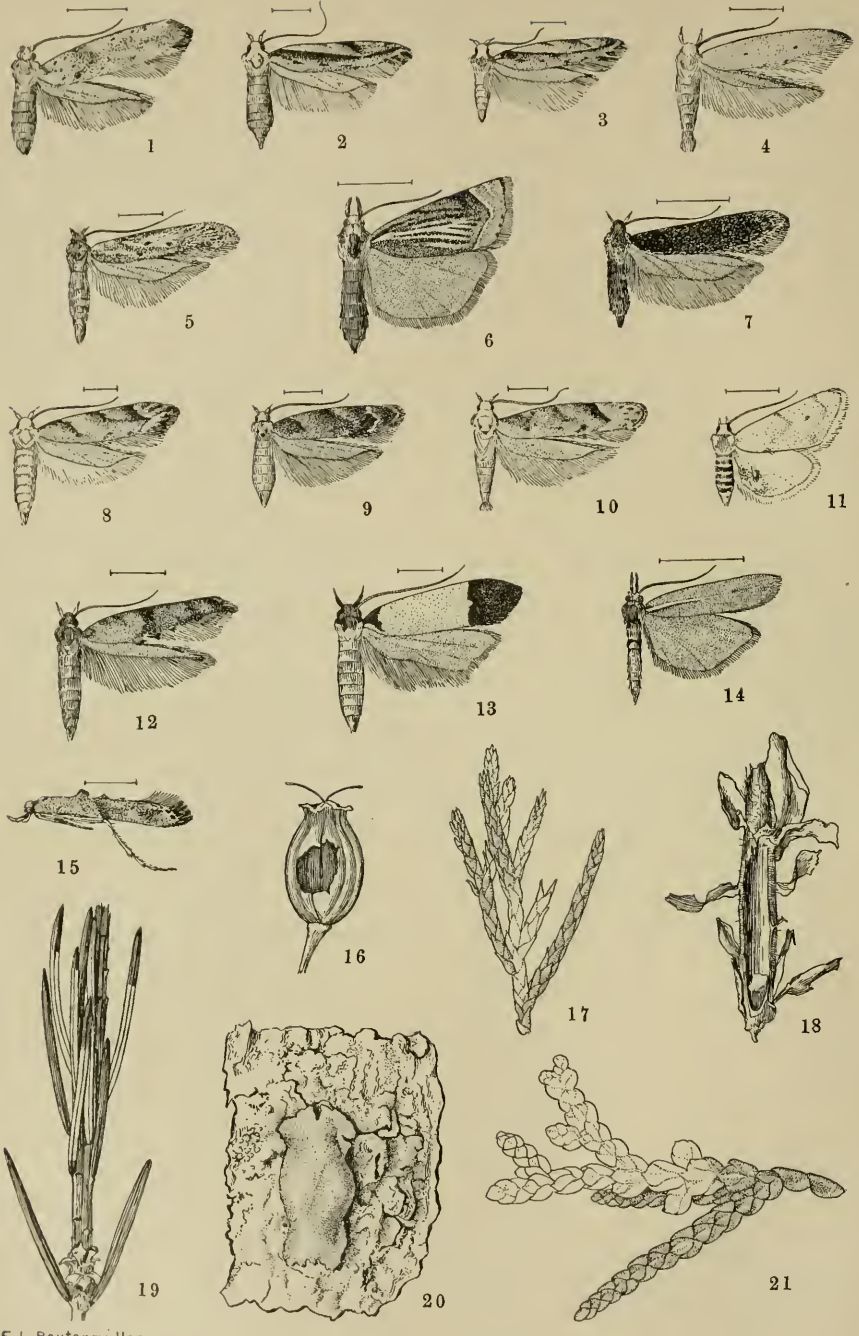
The discovery of this species was rather an accident. An unusual looking insect on the flower head of *Cicuta* caught my eye whilst looking carelessly at the plant; close examination showed it to be a moth just out of the pupa, with wings as tiny pads; it was bottled and allowed to develop and dry and a careful search made for other specimens, which were soon found in considerable numbers, but all on that date, August 20, as pupæ. The larvæ were not turned up until nearly a year later.

One parasite was bred from this species, *Iseropus inquistor* Say.

Epimenia ramapoella, sp. nov. Plate IX, Fig. 4.

Head, palpi, thorax, patagia, abdomen and front wings pale creamy brown faintly tinged with red, and irrorated with very minute dots of fuscous. Front wings: Three small black dots along median line, one at inner third, one at half and one at outer third; two small dots of black on costa just before apex. Irregularly dentate along middle third of inner margin, defined by two clusters of longer scales, all tipped with black. At base of wing and along inner margin before anal angle ground color is less creamy brown and more whitish-gray, while on apical third the brown scales are closer together, becoming intensely brown at apex. Cilia shining brown, shading into dark fuscous at apex, length not quite width of wing. Hind wing gray, cilia same as front wing and about twice width of wing. Underside both wings and cilia shining brown. Underside abdomen dark brown, except outer edges each segment light brown. Legs same as general ground color, a shade paler at joints. Alar expanse 14 to 16 mm.

* Meyrich, Handbook Br. Lep., p. 691.



New Tineoidea.

Described from five specimens, all taken at Ramapo, N. Y., May 27, 1900, on a steep mountain side, in dense woods. The moths seemed fairly abundant flying up from the shrubbery as it was disturbed, or from one tree trunk to another. A much larger series could easily have been taken, but on this particular date the woods were almost uninhabitable from the myriads of very small hymenopterous? insects, which gathered in clouds about one's head and required constant slapping of neck, face and hands.

Type U. S. Nat. Mus., No. 6966. Cotypes Am. Mus. Nat. Hist., and collection Kearfott.

MONTCLAIR, N. J.,
August, 1903.

EXPLANATION OF PLATE IX.

Fig. 1. *Zelleria celastrusella* Kearfott.
Fig. 2. *Recurvaria obliquistrigella* Chambers.
Fig. 3. *Recurvaria juniperella* Kearfott.
Fig. 4. *Epimenia ramapoella* Kearfott.
Fig. 5. *Gnorimoschema artemisiella* Kearfott.
Fig. 6. *Crambus vachellellus* Kearfott.
Fig. 7. *Gnorimoschema busckiella* Kearfott.
Fig. 8. *Recurvaria thujaella* Kearfott.
Fig. 9. *Recurvaria piceaella*, var. *nigra* Kearfott.
Fig. 10. *Recurvaria piceaella* Kearfott.
Fig. 11. *Symphysa adelalis* Kearfott.
Fig. 12. *Epimenia cicutaella* Kearfott.
Fig. 13. *Anacampsis coverdalella* Kearfott.
Fig. 14. *Thaumatopsis daeckellus* Kearfott.
Fig. 15. *Epimenia cicutaella* Kearfott, dorsal view.
Fig. 16. Seed of *Cicuta maculata* Linn., excavated by larva of *Epimenia cicutaella* (enlarged).
Fig. 17. Mine of *Recurvaria juniperella* (enlarged) on *Juniperus communis* Linn.
Fig. 18. Section of gall on *Aster patens* Ait., caused by larva of *Gnorimoschema busckiella* (enlarged).
Fig. 19. Mines of *Recurvaria piceaella*, in needles of *Picea mariana* Mill. (enlarged).
Fig. 20. Case of *Symphysa adelalis* on lichen (enlarged).
Fig. 21. Mine of *Recurvaria thuiaella* on *Thuja occidentalis* Linn. (enlarged.)

Micro-Lepidoptera—Suggestions.

By W. D. Kearfott.

Part I.—Pinning and Setting.

Micro-Lepidoptera in North America are in for a boom, if one dozen letters from new correspondents within the past thirty days, asking for directions of all sorts regarding setting, collecting and breeding can be placed in evidence; and as it would be impossible to do justice to each separately, the Editors of our popular News have offered their pages.

These suggestions make no attempt to illustrate all the ways that each thing can be done, but only an effort to describe in a simple manner that can readily be followed by any boy or girl, at little expense, the methods and apparatus that I have used for the past five years, during which time I have collected, bred or received and mounted over twenty thousand specimens.

One of the most important things to get over is the fear most of us have that because an insect is very small we will certainly spoil it. This will surely be the result if we do not bear in mind that a small body contains but little moisture and will dry out and become stiff in a few hours on a summer day, unless a tight metal (zinc is best) collecting box is used, in which the cork can be moistened once in a while; and also that a setting board with a half-inch slot is not suited for spreading an insect that expands but little more.

Also remember that practice makes perfect, and do not be discouraged if the first or second or third attempt results in fairly good studies of venation but more or less poor cabinet specimens; persevere, and in the fourth or fifth or tenth attempt we will want to call in all the family to see how skillful we are becoming.

Pins.—I use only two sizes, the larger, English, made by Kirby, and known as No. 1 Steel, needle-pointed, black japanned. These are very thin and remarkably stiff, made of spring steel; the head and point can almost be bent together and when released will spring back perfectly straight. The head of this pin is pressed out of the same wire of which the

pin is made, just like a common household white pin, and never comes off.

The smaller ones are German made, and known as Minutien Nadeln; they are very fine, also steel, black-japanned and needle-pointed, length about half an inch; their use involves a double mount, which will be referred to later.

Avoid as a pestilence any pin, white, black or gold, that is part or all brass. Verdigris will surely result sooner or later. Also avoid steel pins with heads made of a different metal squeezed on. These heads will come off at most inopportune times, and the resultant spring of the pin will send the wings and abdomen in every direction.

Don't permit the dealer to sell what he has in stock, but insist on the right sort and he will be forced to get a supply of them.

PINNING.—Half the work of good setting is the way the pin is put through the thorax. It should rake well forward and the point should enter as nearly as possible the exact center of the thorax, and if the proper angle is observed it will come out on the under side through the posterior edge of the last thoracic segment, and thus be clear of and prevent damage to the legs; as shown in Fig, 1.

Fig 1

Never lift a specimen with your fingers, at any stage of its progress from the net to your cabinet. Always have at hand a small pair of fine-pointed forceps; the kind jewelers use are

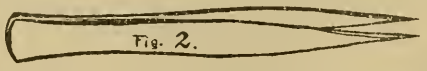


Fig. 2.

the best, about 4 inches long, cost about 15 cents; and whenever a specimen has to be moved (before the pin is in it) use these fine forceps, catching hold by a leg, never by the wing.

It requires a little practice and patience to pin properly. I usually lift the insect carefully by one leg and lay it in the crevice formed by holding the forefinger of my left hand against the thumb, always with the head of the insect pointing toward me. Then, with the same forceps in right hand, pick up a Minutien Nadeln, being sure to have the point in the right

direction, and push through thorax until you can feel the point, then holding top of pin by forceps, push the insect to desired height, by sticking pin in a piece of soft pith, that of common elder, *Sambucus canadensis* L., being the most satisfactory. The same procedure if Kirby No. 1 pin is used, except the forceps for handling pin are unnecessary. Fig. 3.

Fig. 3.

In connection with this operation, two small points will be useful to observe. 1st: if the ends of the forefinger and thumb are very dry, the insect is liable to slip about and dodge the pin. To overcome this, dampen end of finger, rubbing it against thumb until you can feel the least bit of a sticky feeling. The second point: when pinning the insect, steady both hands by letting the tips of the two little fingers press against each other.

SETTING NEEDLES. — Nothing better than common fine cambric needles, a package costing only a few cents, stuck eye end into extra long match sticks. This is easily done by holding needle in left hand, vertically, with point on piece of hard wood,—desk-top, for instance,—in the right hand hold the match stick and firmly and gently force it down, so that the eye of the needle goes up into the stick for three-quarters of its length. The match wood being so much softer than the

Fig. 4.

top of desk, the point goes into the latter only a very little and comes out easily. A few needles will be broken, but with care the majority will be all right. Afterwards with a sharp knife whittle off needle end of stick to a neat taper. Fig. 4.

SETTING BOARDS.—Use exactly the same kind as you do for macros, but make the slot just a trifle larger than the bodies of the insects. The widths of slots of my boards range from one-sixteenth to five-sixteenths of an inch; the two sizes most commonly used have one-eighth and one-quarter inch slots.

As the pins I use will not go through thick cork without dangerous forcing, I glue a strip of elder pith on the under

side of the slot; if pith cannot readily be procured, very thin sheet cork (1-32 inch) can be used. This must be of the very best quality AAA, free from knots and holes. My boards are thirteen inches long and are made from one-quarter inch thick well seasoned white pine, of the quality known as pattern lumber. A dozen boards of this length can be made by any boy in half a day. He should first go to a carpenter shop and have this list of sticks cut out by the carpenter and smoothly planed all over.

8	strips,	¼	in. thick,	½	in. wide,	13	in. long	(tops).
4	"	¼	"	1⅛	"	13	"	(bottoms).
8	"	¼	"	¾	"	13	"	(tops).
4	"	¼	"	1¾	"	13	"	(bottoms).
8	"	¼	"	1	"	13	"	(tops).
4	"	¼	"	2⅜	"	13	"	(bottoms).

In addition get about six feet in length of the same boards, ¼ inch thick, ⅞ inch wide, but sawed *cross-grain*. The above is sufficient for twelve boards of three different sizes. Enough for a beginning.

To put these together, clear the desk or table of all other objects, separate the different size sticks into piles, have the cork cut into half inch wide strips—or if you can get pith have it ready, one side cut flat, take a razor or extra sharp knife to cut this, and have your glue pot in working order.

Start first and glue the cork to the bottom side of the top strips by laying two of equal width together and carefully separating them exactly equally their whole length one-sixteenth, one-eighth, or whatever width the slot is to be. Then hold the strip of cork in one hand, and with the brush touch both edges of one side lightly with thin glue (this must be done quickly); then lay glued side down on strips, carefully pressing, but avoid getting any glue into slot or on the center of cork that goes under slot.

Very carefully push this pair of tops to far side of table, out of the way, placing a book on them to insure drying firmly and evenly. Continue this operation until all twelve pairs of tops have cork glued under them, and then prepare the bottom boards by attaching the end and side pieces or uprights. These

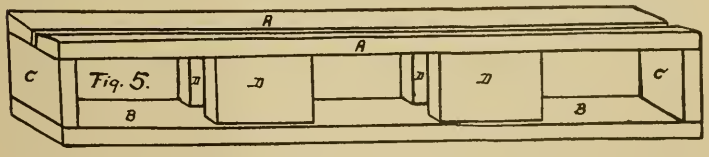
latter are made from the cross-grain strips, and can easily be split with a pen-knife into proper lengths, which for the end pieces must be the same as the width of the bottom boards. I use two uprights on each side of my thirteen-inch boards, about an inch wide, to give stiffness and prevent springing of the completed board.

Now with the glue brush put a liberal quantity of glue on one end only of each end and side piece, placing them in their respective positions on the bottom board. As soon as this is done, repeat the dose of glue on the top ends of these pieces, and carefully lift the first corked pair of top boards, which will be rigid enough by this time to handle gently, on top of the uprights; then move to a permanent drying place, with books or weights on top. Finish up the other eleven in the same way, and leave two days to thoroughly dry.

The boards are complete now, but perfectly flat on top, which is objectionable, and must be remedied by running a small plane a few times over the surfaces, taking the deepest cuts on the inside. The wood is so soft and easily worked that this is much simpler than it seems. I use a little steel and iron plane one and a half inches wide that cost about 40 cents.

Be very careful to see that the inside edges, which are now the upper edges of the slot, are perfectly even and level to each other. If slightly irregular, the final finish with very fine grade sandpaper will make them even.

Fig. 5 shows an outline of a finished board and position of the several parts, except the cork, which is hidden by the top boards.



A, top boards. B, bottom boards. C, end uprights. D, side uprights.

There are several ways of expanding specimens practiced by our well-known collectors, and attention and practice with

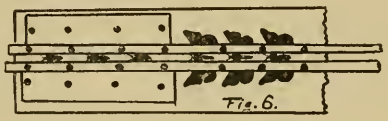
any system will insure good results. The advantage I find in the following is simplicity and rapidity; I can usually average from forty to fifty specimens per hour.

Have a goodly number of strips of paper ready; these should vary in width from one-sixteenth to three-eighths or half an inch, and an inch longer than the boards. The best paper is heavy book linen; a visit to any bookbinder or printer will find a mine of suitable strips around his trimming machine, and if he is not too busy he will put a thick layer of these scraps in the machine and shear them off in different widths. All of which will save the trouble of cutting them out with scissors and insure their edges being parallel to each other. A supply of setting pins is also required, and the best I know of are the cheap black glass-headed steel mourning pins, "Made in Germany." Thirty or thirty-five cents will buy a dozen small boxes or about five hundred.

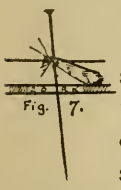
SETTING. — With setting board in front, several setting needles handy, setting pins alongside, relaxing box on left side, and fine-pointed forceps within reach, we are ready to begin.

First select two of the narrowest strips of paper, pinning one end of each firmly into upper end of board, close to but not overlapping the slot; then with forceps take a specimen from box, quickly pin it in the slot at the top of board, with pin nearly vertical, just a little inclined forward; with needle raise the wings until they rest flat on each side, then bring the two paper strips down over the wings; in this position hold left thumb or forefinger on the strips, an inch or two below the moth, and with the setting needle in right hand, first draw one pair and then the other pair of wings into a position so that the hind margin of forewings makes a straight line; after getting each pair of wings in position, stick a pin through the strip just below and close to the moth. Continue repeating this until your board is full, and then pin on each side a wider strip of paper, to cover entirely the projecting ends of the wings. Sometimes this last process cannot wait until entire board is finished, as some specimens are more inclined to curl than others, and if the wings show the slightest tendency to

rise up, then use short outside strips for each half dozen, more or less, as may be necessary.

Fig. 6 shows upper end of board, with the inside narrow strips in position and pinned down over six moths, and a short outside strip covering the first three moths. The large black dots are the pins.

Moths die usually in one of the following three positions, and the manipulation is different for each, but all are easily handled if treated tenderly.

First, with wings down against their sides, hiding feet. It requires a little care to pin specimens in this position, but if the moth is soft or properly relaxed, it is the easiest to spread. Supposing that the pin has been inserted so that it angles forward (Fig. 1), it must be put in the board so that it is nearly vertical to the surface of the board (Fig. 7); this makes moth with head slightly higher than abdomen; run the setting needle under one pair of wings and, with a quick jerk, raise it, and the wings will be found to be in almost the correct position on the board.



Second, with wings elevated on both sides, entirely hiding the upper surfaces (Fig. 8). To set one in this position, pin as before and, holding the inner strip between second and third fingers of left hand just high enough to clear wings, with the setting needles gently press on the bases of the wings, and as they go down toward the board bring the paper strip down, and very quickly they are in position.

Third, with wings drawn close to body, sometimes almost rolled around it. This is the hardest position, but should be treated the same as the first; in fact, it is well in both of these positions to attempt to draw out the wings before the pin is all the way down, being careful to use the setting needle on the

under side, as a lifter, as much as possible, avoiding using the needle on the upper surfaces except to lightly bring into the final position.

Double Mounts.—Fig. 9 shows a double mount complete. To prepare the little strips, take a sheet of 1/8-inch AAA cork, and with parlor paste stick a sheet of good quality white paper on one side only, and place between two books or in a letter-press for a few hours to dry smoothly and evenly. Then, with a very sharp knife, cut the sheet into strips about an eighth of an inch wide; then cut these strips into short lengths, three-eighths to three-quarters of an inch long. Stick a No. 6 pin through one end of each, with the white paper side up. Have plenty of these mounts on hand, and as you remove your specimens from the setting boards, those that are pinned with Minutien Nadeln can be immediately pinned on the double mount, and as soon as locality label is placed on the big pin, as shown on figure, are ready for the cabinet.

Fig. 9.

The locality labels are nearly of as much importance as the insect, and a collection with every specimen bearing label showing place and date of capture is worth about ten times as much cash value as the same collection with the labels absent.

My labels are printed with locality on top line, my name on second line, and a blank space left below the name for the date. I strongly urge all collectors to have their names on the label. It adds much to the interest in the specimens, and, as is often the case, if the species is new, whoever describes it can give credit to its actual discoverer. In dating labels don't use figures for indicating the month. Either write it in full if short-name month, or abbreviate if too long to write in full, or use the Roman letters, *i. e.*, vi, 26 equals June 26th or, if your preference is to put the day first, 26, vi. It will always be understood.

Part II.—Collecting.

The favorite European practice is to bring home the specimens alive, each in a small willow-chip pill box, killing them in the evening or the next morning just before expanding. The chief merit of this system is in the naturally relaxed condition of the moths, but its disadvantages seem to me to far outweigh the advantages, principally in the large bulk and great number of boxes that have to be carried, the danger of the moths flying around in the confined space and losing their scales, and the always possible catastrophe of a stumble or fall by which a goodly number of the fragile boxes will be reduced to splinters.

Of course, the ideal way of obtaining flawless specimens of Micro-Lepidoptera is by breeding, which will be the subject of the next paper; but as many specimens can be taken with a net, that may never be secured in any other way, it is desirable to have the apparatus to fit the smallness of the specimens and to be as simple as possible.

The Net. — The net is the most important part of the outfit; and I have gradually reduced the size of the one I use to only about half the diameter of the common butterfly kind. It is six inches in diameter at the top, and in length twice its diameter or twelve inches (the same ratio should be used for any diameter). I have tried all sorts of patent and folding nets, but they all seem to be weak in some part, and give out when most needed. A frame and stick I have used constantly for over three years was made as follows:

The frame is a piece of three-sixteenths diameter spring brass wire, total length about twenty-four inches, bent in a circle, with two four-inch straight ends, like Fig. 10. The stick is a slender bamboo cane, cut to a length of two feet; both ends should terminate at a joint. In the smaller end, just below the joint, cut a small hole on each side, and below the holes for two or three inches wrap the bamboo with fishing cord to stiffen it and prevent the holes from becoming cracks. The stick can also be divided in the middle, with a pair of ferrules from an old fishing rod securely fitted to the cut ends; which

will make it possible to stow all apparatus away in bag or pockets and avoid the scornful looks and remarks of those who do not entirely appreciate the scientific value of our pursuit.

Fig. 11 shows the jointed stick, with the straight ends of the frame tucked into the holes provided for them, which latter

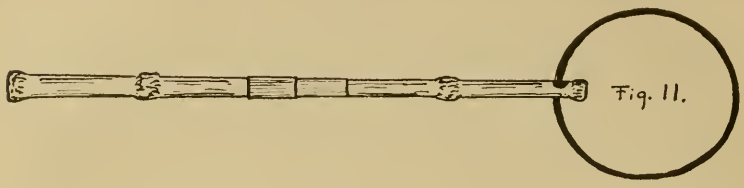


Fig. 11.

explains the reason for selecting bamboo, namely, that it is hollow between the joints, and in addition is very light and strong.

The best and most durable material I have been able to find for net-making is white *mousseline-de-soie*, which can be bought at any drygoods store ; it is a very fine mesh silk veiling, and so woven that the threads do not draw apart, as is the case with any material woven gridiron fashion, like common mosquito netting. The net is cut leg-of-mutton shape, and the seams should be sewed down on both sides ; at the top should be sewed a piece of two inch wide white silk ribbon, turned over, to make a channel for passing the wire through (Fig. 12). Be sure the small end at the bottom is well rounded, leaving no corners.

Fig. 12.

KILLING.—Ether and chloroform are objectionable from the fact that insects killed by their use usually die with muscles so rigid that it is often difficult to properly set them, and even after taken from the setting board, with wings flat, there is a strong tendency to revert to the position in which they died.

Insects killed with cyanide of potassium, on the contrary, die in a perfectly relaxed condition. I have never used spirits of ammonia, but imagine it would tend to affect the colors, especially greens and pinks.

My cyanide bottles for micros are made of the common test-tubes which can be purchased in any drug store for a few cents each. The most satisfactory size is about six inches

long by three-quarters of an inch in diameter. It is well to have more than one for fear of accident, and also that too many moths may not be in the same tube at the same time. Three or four can easily be carried in top coat pocket, and when I expect a big day's work I load both top coat and vest pockets.

The cyanide should be crushed into small lumps, about size of buckshot, and put in bottom of tube from one-half to three-quarters of an inch deep ; on top of this put a layer of sawdust one-quarter to one-half inch thick, and on top of the sawdust pour a teaspoonful of liquid plaster-of-paris. The chemical action caused by the contact of the sawdust and cyanide very much increases the strength of the latter. Leave open for a couple of hours and then push a small piece of absorbent cotton in the tube, shoving it down as flat as possible against the plaster. This will prevent the moths from sliding around over the smooth surface of the plaster and rubbing off their scales. Fig. 13 shows a test-tube properly charged, and it is surprising, considering the very small amount of cyanide, how long its strength continues at full power. I have some that are still as good as new that were made two and three years ago. Their length and slightly flared mouth make it particularly easy to manipulate them inside the net. But they are much more fragile than the ordinary bottle or jar, and the greatest care should be used, in case of an accidental break, to dig a little hole and bury all the fragments in the earth. If a finger is cut by the sharp edge of the broken glass, get it immediately into water, rubbing vigorously to get all the poison out of the wound.

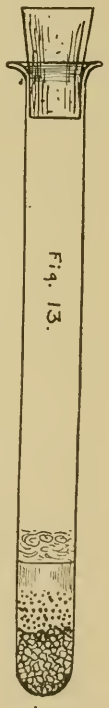


Fig. 13.

Collecting Box.—The best boxes are made of thin sheet zinc, which does not rust like common tin, nor verdigris like brass. My boxes are oval in shape, and are cork-lined inside on both bottom and top.

Two sizes are convenient to have, the smaller about 5 by 3

inches and the larger about 7 by 4 inches. Either can be carried in a side coat-pocket. I also use these same boxes all winter for relaxing dried specimens; a teaspoonful of water is sufficient, and for very small Tineids and Tortricids four to six hours will make them just as soft as they were when first killed; much longer than this will make them wet, and once wet it is impossible to do anything with them. A longer time, say twelve hours, for the large, robust-bodied Tortricids and medium-sized Pyralids, and the large specimens of the latter family can remain twenty-four hours in the relaxing box without coming to harm. While on the subject of relaxing, it might be well to observe that it is very advantageous to use two boxes at the same time. The largest we can call the storage box, which must be kept tightly closed all the time except when opened quickly to transfer half a dozen to a dozen insect specimens into a smaller box; from the latter they are to be taken one by one for setting. If only one box is used, and fifty or more specimens are under way, the constant opening and releasing the moist air will cause a good many of the last specimens to become too dry to work with. For this same reason, pick out and spread those with the smallest bodies first. I do very little setting in the summer time, simply pinning the specimens when fresh and storing them away until winter, and find no difficulty at all in getting the moths as perfectly spread as if this work had been done when they were freshly killed. But if the time is available, and it is preferred to set the specimens as soon as possible after they are caught, it will then be well to sprinkle a little water on the cork of the box while out in the field or woods, so the moths will not dry too much before getting home.

The brown canvas or khaki cartridge bags, sold in gun and sporting-goods stores, with a leather shoulder-strap, are very convenient and of light weight for carrying such of the apparatus as the pockets will not hold; they are made in several sizes, and range in price from sixty cents to one dollar and a half.

The above apparatus, with a supply of pins, forceps (Fig. 2) and a short stick or two of elder pith are all that are needed

for collecting the perfect insects. Skill with the net is easily acquired, and slipping the cyanide tube into the net and securing the moth requires no particular explanation, a half-day's work will result in both operations becoming very easy. But bear in mind that more than two or three specimens in each tube will probably cause all to lose much of their freshness. When this number is in each tube, sit down on a log, rock or fence-rail, with back to the wind, open collecting box and place on knees, then gently tilt one tube so that the moths drop into the upturned top of box; with forceps lift up and pin as described on pages 90 and 91, sticking the pinned specimens in the bottom of the box. If any of the moths stick to the cotton in tube, either shake it gently or use the fine-pointed forceps. It is not well to empty the moths from all of the tubes into top of box before beginning to pin, for fear of the moths coming in contact, wind blowing them around, or the fence-rail breaking; expose just as few at a time as possible, and remember that a day's work which consists of only a dozen perfect and flawless specimens is of far more real value than one in which two hundred are brought home in any old condition.

While Micro-Lepidoptera can be taken every hour of the twenty-four and almost every day of the year, there are, of course, times and places more favorable than others, and a reference to some of these and the general habits may be of interest.

Pyralids are easily disturbed in the daytime, when walking through the undergrowth of thickets and light woods, and while the flight of some species is swift, the majority do not fly more than twenty feet before seeking a new place of rest, which is almost invariably on the *under side* of a leaf; to catch them, the eye must be kept on the leaf, and after approaching it quietly drop the net almost to the ground, and with a quick upward sweep and a turn of the wrist, the game will usually be found inside.

Tortricids are as a rule even slower flyers than the pyralids, and unless a wind is blowing to assist them, will rarely fly more than five or six feet; they are as easily disturbed as the

Pyralids in the daytime; but, while smaller, they are easier to see, as they usually alight on the *upper side* of a leaf.

The majority of Tineids keep themselves well hidden during the daylight hours, and only come out for their natural flight about the time the sun goes down; and a good day's work can be done during this twilight hour, for a half hour before sunset until too dark to see. Back of my home, in the Orange Mountains, in a favorable spot in the open woods, surrounded by low shrubbery and weeds, I have often caught one hundred and more Tineids during this hour, without moving half a dozen steps from one spot. This time of day also seems to be the time of natural flight of a good many species of Tortricids, especially the earliest warm spring days in March and April, and the Indian Summer days late in the fall, November and December. Many species of Tortricids can be taken in abundance at these seasons that were before rare and almost unknown. On March 14th last year I spent an afternoon in the woods, and only caught three or four specimens up to five o'clock, but from then until dark I secured several dozen. November 3d I started collecting at ten in the morning and at four-thirty in the afternoon had perhaps two dozen well-earned specimens; but then the flight began, and until it was too dark to see I caught them just as fast as I could bottle them, more than one hundred specimens, and all very good ones.

The trunks of trees should be carefully examined in the daytime; many a good Tineid or Tortricid will be found in the crevices of the bark, and the bottle can be employed directly on the moth, without the use of the net.

Light in an open window or the electric lights in front of stores are also very attractive to nearly all moths. Sugaring does not produce satisfactory results with the micros. I cannot urge too strongly the more general use of a Moth Trap by all collectors who are located in the country or suburbs, where it can be placed so that the light shines over a patch of weeds or an overgrown thicket, and where it will be safe from boys who think it a joke to break the glass; as it works while we sleep. The trap I have had the most success with is an adaptation of one described in vol. vi of the Bulletin of the Brook-

lyn Entomological Society (1883), and a cross-section is shown at Fig. 14, and an outside view at Fig. 15. The dimensions are about forty inches long, of which ten inches are the lamp compartment: the wide flaring mouth or open end is about eighteen inches square; the width at the other end tapers to nine inches; and on the back of the lamp compartment is a hinged door. The whole frame of the trap is made of one inch thick poplar, except the top of the lamp space, which is better of tin to avoid danger of fire. A hole on top, with a bottomless tomato can for a chimney, will prevent the wind from blowing out the lamp. The oblique lines in the sectional view are sheets of glass, the outer and inner beginning at the bottom and reaching to within one inch of the top, the middle sheet starting at the top but not reaching the bottom by one inch. Of course, a fourth pane of glass separates the lamp from the trap proper. On the floor of the inner compartment, just in front of the lamp space, is a circular hole for the insertion of the cyanide jar.

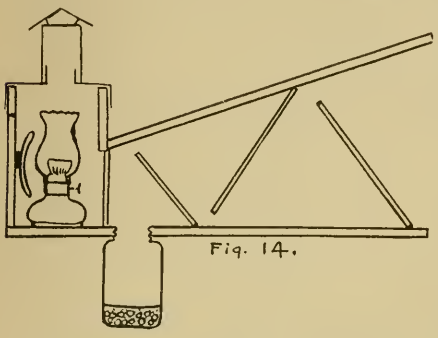


Fig. 14.

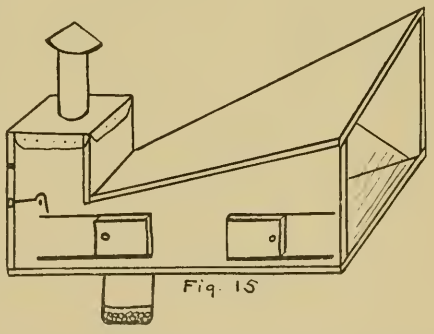


Fig. 15

This should be a one- or two-quart Mason fruit jar with screw-top. The most convenient way to use the jar is to have two screw-caps, one of which has the entire top cut out, leaving only the screw-ring; this ring should be permanently fastened in the hole made for it in the bottom of the trap; a good joint can be made by tacking a lid of a cigar-box on one side of the hole; then lay the ring (with big end down) on the

cigar-box lid, and carefully pour plaster of paris around it until all the space is filled; after the plaster hardens, the cigar-box lid can be pulled off and thrown away.

Then, just before dark, remove the solid cap from the jar—which should be tightly stoppered all day to regain its strength—and screw it up into place and, after lighting the lamp and watching it awhile to see that it does not smoke, it is ready to work all night. With this trap, in my home locality, I usually caught from fifty to three hundred specimens each night, from April to November, of which seventy-five per cent. were Tortricids and Tineids.

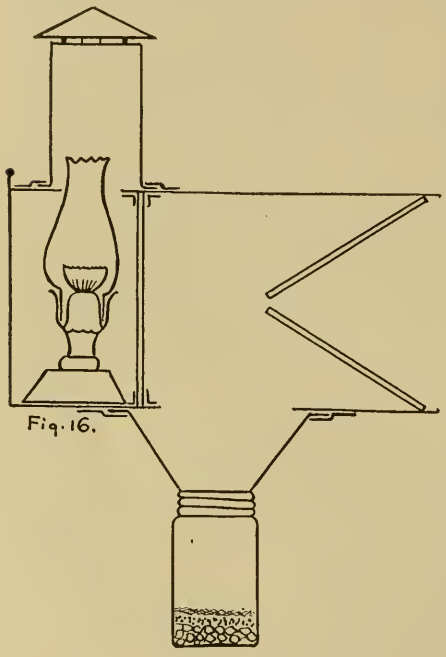


Fig. 16.

Beetles do not seem to be particularly attracted, which is very fortunate, as an able-bodied specimen would work havoc before he succumbed.

I neglected to say that all of the inside of the trap should be painted with several coats of good white paint, and a silvered-glass reflector put on the door back of the lamp; both add to the glare and attractiveness. For protection the outside should be painted dark green.

A very much smaller and simpler trap is shown in section at Fig. 16. But it will require the services of a tinsmith, as it is nearly entirely made of that material. This is the design perfected by my good friends in West Brighton, Pa., F. A. and Harry D. Merrick, and to them I am indebted for the sketch and the following description. The total length is fifteen inches, by eight inches wide and eight inches from top to

bottom. The lamp compartment is four inches long. The chimney and top of lamp compartment are made to slide into place, and the same arrangement is provided for the funnel-shaped piece at the bottom, into the small end of which a Mason fruit-jar screw-top, with the centre cut out, is soldered.

These slots or slides are shown in the sectional drawing by what look like detached pieces, but of course they are soldered or rivetted to the body of the trap.

The entire back of the trap is a door working in grooves, and can be entirely removed at the top. The hole in the top for the lamp chimney is placed over the front end of the lamp space, so that the lamp can be easily removed by tilting. There are only three sheets of glass, all of them 7¾ inches square. The two front ones are arranged as shown, and come to within half an inch of each other in the middle. They, as well as the sheet of glass in front of the lamp, are held by grooves made by turning up the edge of a strip of tin. The The great advantage of this form of trap is that it is easily portable, as the projecting pieces, top and bottom, the glasses and the lamp can all be removed, and the whole apparatus packed in a telescope travelling bag sixteen inches long by eight inches square. One-pint jars are amply large for this trap. It should also be painted white inside and green outside. Last year the Merricks started one trap about the middle of June and a second one early in August; this season they have four ready awaiting the first mild night. The great advantage that must not be lost sight of is that they "work while we sleep."

The large jars for traps should be made with a layer of cyanide lumps as large as a chestnut, about one inch deep on the bottom, over this another inch of damp sawdust, with sufficient plaster-of-paris to hold all in place.

This will make a very powerful jar, killing almost instantly, but it is also liable to become very wet after having been in use a short time, therefore pieces of blotting paper, cut exactly the diameter of the inside of jar, should be put in from time to time to absorb the excess moisture, and the layer of raw cotton on top of the plaster may have to be renewed every two or three days, to prevent soiling the insects.

After sending the copy of the first part of these Suggestions to the Editors, I received from the American Entomological Company a sample card of American-made steel, black japanned, needle-pointed pins, which are far superior in finish, stiffness and springiness to any European-made pin I have ever seen. No. 00 is a trifle less in diameter than the No. 1 Kirby, which latter is about the thickness of No. 0. I can heartily endorse these new pins; the best grade are to be known as "No. 210 Special double japanned." The only criticism to be made is that the heads are a separate piece; but this may be remedied if we all bring pressure to bear on the makers and insist on a head that cannot come off.

Part III.—Breeding.

I am quite sure the only reason that every American collector does not increase his collection by breeding from the larvæ is the immense bugaboo he has raised up in his mind of the difficulties, extra work and elaborate cages and apparatus required.

In England and throughout Europe the acquisition of specimens by this method is, if anything, more common than catching the perfect insects with a net. The great majority of species offered through the "Exchange columns" of European magazines state that the specimens are "bred."

The apparatus actually required for the work is absurdly simple,—a few tight tin or zinc boxes and wide-mouth vials for the field and a few common jelly-glasses with tight tin covers or small wide-mouth screw-top jars for the house, are all the apparatus required for a beginning.

It is a mistaken notion of the average collector that larvæ must be raised in cages, with gauze wire on one or more sides to give an abundant supply of air. The amount of air actually required is so infinitesimal that no provision at all need be made for it. A very great advantage of the tightly closed vial or jar is that the leaves or food of the larvæ will retain their freshness and palatability for a week or ten days; whereas, with the wire cage, the leaves are often wilted and stale a few hours after they are placed in it.

The great secret of success is cleanliness, which will be elaborated on later.

For Micro-Lepidoptera larvæ I prefer for actual collecting

in the field the screw-top glass vials shown at Fig. 17. Their advantages are that they are light in weight and occupy but little room ; several dozen can be carried in the khaki cartridge-bag ; they are transparent, and it is easy to select an empty vial or pick out one that contains some particular kind of larva to which we wish to add more specimens, and finally if no further study of the larvæ is required, they can be placed in racks at home without further attention and used as breeding bottles. I usually carry along a few tin boxes, quarter-pound tobacco or cocoa tins are of a convenient size, to provide for such larvæ as may be found in large numbers, or that feed in such a way that larger receptacles are necessary.

These vials come in several lengths. I use two sizes, one three and a half inches and the other five and a half inches long, both about seven-eights of an inch diameter.

Fig. 17.

It is very convenient, and often avoids the danger of mixing different species, to carry a small pad of paper and pencil, and slip in each bottle as it is put in use a narrow slip with name of food-plant written on it or, if name is not known, some word or two of identification.

The time for collecting larvæ begins when the buds are first swelling and bursting in the very early spring, and can be continued as long as the leaves remain in the fall,—in fact, during the entire winter in the stems of weeds and other plants, in nuts and seeds and many other places,—which latter subject—winter collecting—is another story—for the fall.

But we now have to do with the first spring crop of caterpillars, and will start out together this warm May morning, and see how soon we can get all of our vials and boxes filled, and resolved not to be diverted by a single flying specimen, no matter how attractive it may look. By the quickest route we arrive at the outskirts of the town

and avoiding the dense woods. enter a field overgrown with weeds and occasional clumps of higher shrubbery. The first thing to attract attention is the unusual appearance of the young leaves of the wild cherry bushes; instead of being smooth and perfect they are crumpled and twisted into a knot, as if nipped by a late frost; but by carefully pulling apart the entangled leaflets, a small green larva with a black head will be found in a central cavity, and if we are not very careful he will wriggle away so quickly that he will escape to the ground and be forever lost. We can soon fill a vial with these, breaking off the crumpled leaves only, and carefully avoiding opening them or disturbing the tenants, as it is reasonably sure that if the first one examined is occupied, all others on the same kind of plant and of same general appearance will contain each its larva. A few weeks later the moths that emerge will likely prove to be *Archips rosaceana* Har.

Happening to glance downward, our attention is attracted by the peculiar appearance of some of the leaves of the late purple aster (*Aster patens* Ait.), which at this early season of the year is but a slender stalk twelve to fifteen inches tall, with delicate leaves shaped like a spear or arrow-head; several leaves on each plant have one edge, for the entire length of the leaf, evenly turned up and fastened down, forming a little tunnel open at each end, about an eighth of an inch in diameter, looking almost like the retreat of a small spider.

In some of these tunnels will be found a very pretty larva with head and thoracic segments a deep mahogany brown and the abdominal segments pale green, with a number of narrow dark red stripes on the back and sides running from the thorax to the anal end. We will collect as many of these as possible, as the moth that will come from them is a very beautiful Gelechid, *Trichotaphe flavocostella* Clem.

Close by is a small pitch-pine sapling. Some of the needles look dead and brown for about half of their length. Let us see what is the reason. A close look, and at the beginning of the discolored part is a small hole, and if we break one off and hold it up to the light, about the center of the brown space will be seen a long dark object that careful dissection of the needle will prove to be a very small larva, that exactly fits the inside of the excavated needle; fifty or more can be com-

fortably stowed away in one of our vials and, without any attention whatever, will shortly produce a nice crop of *Paralechia pinifoliella* Cham.

Next are some bushes of *Viburnum*, or locally known as Black-Haw or nanny-goat-berry. A pair of leaves are as evenly fastened together at their edges with silk as if they had been sewed with a needle. Within the comfortable little envelope is a rather fat pale-green larva, ornamented with many shiny dark-brown spots, in due time it will produce a beautiful ash-gray moth, *Anacampsis rhoifructella* Clem.

On Bayberry bushes nearby, the tips of the twigs and young leaves are gathered together in a small bunch, and if the larva is pale lusterless green with light-brown head, it will probably develop into *Archips persicana* Fitch.

Here is another *Viburnum* bush, but instead of two leaves sewed together, one leaf has its outside edges brought together and then doubled over, just like we would make two folds in a napkin. The larva is bright green with a pale-yellow head. In good season it will develop into a handsome Tortricid—*Exartema permundanum* Clem. Another Tortricid of the same genus, *Exartema zellerianum* Fern., crumples and distorts the young leaves of White Birch in the same manner as the Wild Cherry species first mentioned.

Under an oak tree at the edge of the woods are a goodly number of last season's acorns that seem to have been neglected by the squirrels; we will cut a few open to investigate. Instead of finding them firm and full of meat, we are at first disappointed to see that each contains nothing but dark-brown powdery dust, but stir up this dust a little with blade of penknife and a larva is discovered; turn out the contents on the palm of the hand and we shall likely find two, both dull gray, one nearly half an inch long and rather stout, and the other slender and only about a quarter of an inch long. The large one is a beautiful Tortricid, *Mellisopus latiferreanus* Wlsm., bright coppery-red with shining metallic-gold stripes across the wings; the small one is a beautiful little Gelechid, *Holcocera glandulella* Riley.

Just outside of the woods are some dry stalks of last year's Evening Primrose. Mother Nature is never wasteful; so we will see what good purpose these useless-looking sticks are

performing in her system of economy. With a sharp knife carefully split one in half, from the flower-head to the root, and at intervals of a few inches apart, we are not now surprised to find cleanly excavated cells, in each of which is a slender pale-yellow larva. When ready to pupate he will spin a soft white cocoon in his cell and emerge about the last of June: but before spinning the cocoon his instinct tells him that the delicate moth cannot penetrate the thick woody wall of the stalk, so he carefully gnaws a small hole through and then, to keep out evil-minded enemies, he covers the hole with a thin curtain of silk. In his perfect state he is known as *Mompha eloisella* Clem., and a very beautiful object he is, shining pearly white, with red and gold markings.

Nearby is a small Hop-tree (*Ptelea* sp.) with many of its leaves drooping, and in a short time they will shrivel up and drop off. With our now experienced eye, we very quickly discover that a small slender caterpillar has made its home in the stem of each leaf. We will fill up a tin box with a good number of these, cutting the stems off close to the branch and leaving a good supply of both live and wilted food. Within a few weeks we will have a nice crop of *Yponomeuta atomocella* Dyar, a very handsome little moth, with salmon hind wings and the pure white fore wings thickly peppered with black dots.

If this is not sufficient material for one morning's work, we can keep up the hunt, and will soon learn that every species of plant-life supports one or many species of insect-life; we shall also quickly learn that each species of insect has its own peculiar and individual way of twisting or crumpling the leaves, sometimes at the tip of the twig and elsewhere. Some curl the leaves into small cylinders; some cut halfway through the stem and hide in and feed on the rapidly withering leaf, preferring this to green and tender young leaves. Others live in the stems and sapwood, in nuts, flower-heads, seeds and seed-pods, in mushrooms and fungoid growths, on the lichens of trees and rocks; many species are leaf-miners, and as most of us have had an opportunity of finding to our sorrow, one very disagreeable little Tineid will even eat the other specimens in our cabinets.

Common jelly-glasses, with tight tin covers, make very good breeding-jars for the house. I also use several sizes of screw-top jars of the style as shown by Fig. 18. They are made in a number of sizes ranging from small ones of an ounce capacity up to large ones about six inches tall by three inches inches in diameter. The particular advantage of both the common jelly-glasses and the screw-top jars is that they have no inside ribs or ledges to gather dirt or for the larvæ to spin their food-plant to and prevent its easy removal for cleaning, etc.

Fig. 18.

For convenience of handling, a few shallow trays should be made, just wide enough to hold a glass or jar, and about twelve or fifteen inches long. For the longer vials (Fig. 17), racks such as are used for holding rows of test-tubes are very convenient.

It is well to go over the material collected as soon as possible after returning from a trip, taking one vial or box at a time and carefully drawing out with forceps the small clusters of leaves that may have been packed in too tightly for comfort, and placing them in a jar of suitable size, so that the contents will not more than half fill it. Then write on a slip of paper date, place and food-plant; use pencil always, the dampness will make an undecipherable blot of ink. Leaves of firm texture, such as those of the hardwood trees, can be closed up tight without danger of sweating or mold, but some of the softer leaves, especially of succulent annual weeds, are apt to get too wet; and if drops of water are observed on the inside of the glass, remove the tin cover and close the top with a piece of cheese-cloth held on by a rubber band. A day or two of drying out is sufficient-

Each jar should be examined every day, both for the purpose of seeing if any moths have emerged and to see that the condition of the larvæ is healthy,—in other words clean. After a very little experience, it will be easy to observe when the food is becoming stale or soggy or that too much dampness is accumulating on the leaves or bottom of jar, all of which will lead to mold and sickness. Then the larvæ must be changed to entirely fresh food and a clean jar. Select a duplicate of the one they were in and place in it a moderate quantity of the food-plant; then dump out the contents of the old jar on a large sheet of clean paper, and with fine forceps carefully examine every fragment, picking up each larva delicately with the forceps,—which will not hurt him if not squeezed too tightly,—and drop him on the leaves in the fresh jar. Should any pupæ be found, it will be better to place them in a separate jar or vial, where they need not be disturbed again; but be sure and write a duplicate label, so that the identity will not be lost.

The great majority of the larvæ taken in the early part of the summer, up to the middle of July, will emerge as moths within one to three weeks after transforming to pupæ. Some of those taken later than this will live as larvæ or pupæ all winter; and species hibernating in this state must be kept out-of-doors under as nearly natural conditions as possible.

I have left to the end the subject of making notes and recording observations of all larvæ that are bred, as it is really the most useful and important part of the whole work. The life-histories and habits of our North American species of Micro-Lepidoptera are so little known that up to this time less than twenty per cent. have been described. So this field is one of the easiest in nature in which a collector just starting can find lots of room for original work.

My method is as follows:—On the slip of paper in each jar I write a number, and in a note-book (card index cards are better) record the same number at the top of the page or card, with date and place and name or description of food-plant; if the latter is unknown, press a piece and send to your nearest botanical friend for determination; with your breeding number on the label.

Then on the card make a description as full as possible of the larva, noting shape, color, stripes and spots on the body, color and spots (if any) on head, thoracic shield and legs. State its habits, whether it crumples, folds or curls leaf, or lives in stems or fruit, and anything that seems interesting about it.

If you can observe date of pupation, make record of it and, of course, when moth emerges do the same.

Put this same number on everything that issues from this particular jar. There will be Dipterous and Hymenopterous parasites; it is just as likely that they are unknown, or at least have never been bred, so your record of their "hosts" will be of value. The pupa and cocoon should also be preserved, and if a sample of the twisted leaf, etc., can be saved, both should bear the same breeding number. It is well to put the initial of your name in front of this series of numbers, as K. 427, to distinguish your bred material from other specimens in your collection that may happen to have miscellaneous numbers on them.

It may not be well to undertake too much at once; but after this work is well started, you will want to preserve a specimen of each different kind of larva. Any method of preserving in liquids is objectionable, owing to difficulty of taking care of numberless bottles and the great trouble of studying the speci-

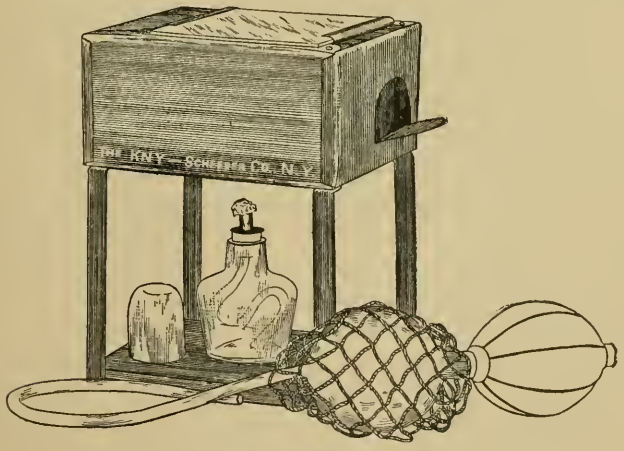


Fig. 19.

men so enclosed. I use an ordinary larva-inflating oven and apparatus, the same as is used for large caterpillars, and as shown by Fig. 19. The only difference in blowing large or small ones is that, for the little ones, the glass tubes must be pulled out to a very fine point. When ready to inflate, I take the alcohol lamp from under the oven and place it before me on the desk and, holding a glass tube by both ends, heat the middle of it in the lamp-flame; when, and not until, it is a dull red, I give both ends a quick pull, which leaves two very fine hair-like points; repeat this until you have enough. Place the lamp back under the oven, so that it will be warmed up for the next operation.

Then pick up a larva and drop him for a moment in a tiny glass of alcohol, and as soon as he is motionless, lift him up and lay on end of forefinger of left hand, with anal end up; then very gently, with thumb or pencil, squeeze the contents through the anal opening; a sharp knife to scrape this away as fast as it appears will prevent discoloring the skin.

Still holding the deflated skin between thumb and forefinger of left hand, pick up a glass tube, wet the point to prevent sticking, and carefully insert in anal opening. Then for a second or two hold in the oven, which will cause the skin to stick fast to the tube. Then stick the big end of the glass tube in the rubber tube connecting to the double bulb, and give the latter the least bit of a squeeze, and if everything has been properly done, the skin of the larva will spring out rounded and full size. Then, still keeping up light pressure on bulb, place in oven for a minute or two, until the skin is hard.

With a pair of sharp scissors, snip off the glass tube about a sixteenth to an eighth of an inch behind the larva.

To mount, draw a number six pin through a small block of cork about a quarter of an inch square, then at right angles to the big pin stick a Minutien-Nadln through until the point comes out the other side a quarter of an inch or more. Touch the point of the Minutien-Nadln with thin shellac and carefully raise the larva and stick the point in broken-off end of glass tube. Label with usual locality label and breeding number. Of course, the same tube can be used many times,

by holding the broken tips of two over the flame together, which will fuse them ; let them cool a moment, and then heat a little back from the junction and draw out a new point.

As soon as the name of the bred specimen can be obtained, it should be written on the card, containing its life-history, and from time to time the facts should be published. The Editor of the NEWS is hungry for just such original notes. My services are freely offered here as elsewhere, and if any collectors care to send me, in the fall after the breeding season is over, their notes and specimens, it will be a pleasure to identify the latter and put the former into shape for the printer, of course, giving full credit to the collector.

The space limitations prohibit a very elaborate explanation of every detail of the work which has been outlined in a general way in this series of articles, and naturally some essential points have been overlooked ; for instance, the proper height at which the insects should be placed on the pins, which, in the case of Kirby No. 1 pins, should be at such a height that three-quarters to seven-eighths of an inch of the pin is below the thorax. This will make the plane or flat surfaces of the wings, when spread, about one inch above the point of the pin. Minutien-Nadln should be stuck clear through the thorax, leaving only about an eighth of an inch of the head or blunt end above it,—just enough to grasp with the forceps ; this will leave the greater part below the insect, where all the length possible is required for pinning on setting-boards and through the double mount. Mr. Merrick calls my attention to this omission, and also adds that the tin portable moth trays, made from his plans, should be rivetted together and not soldered. Experience with solder on several occasions was disastrous.

As the majority of the readers of this are well aware, Mr. Merrick has a large heart and kindly disposition ; hence, anyone wanting to know more about the traps of his invention will receive full advice and direction by addressing him.

My collection of all of the families of Micro-Lepidoptera is very complete and well worked up ; in fact, some groups contain a larger proportion of named species than any other col-

lection in North America ; hence I am always willing and glad to name small or large lots of specimens for new or old correspondents, and invite correspondence from any and every one who may be or who may become interested in this very fascinating study, and advice or assistance can always be had for the asking, both in regard to the collecting and rearing, as briefly discussed in these papers, and as well the identifying of specimens.

The electrotypes of Figs. 17 and 18 were loaned by Messrs. Whitall, Tatum & Co., and of Fig. 19 by the Kny-Scheerer Co. All of the special apparatus referred to in these Suggestions can be purchased at reasonable prices from the dealers who advertise in the NEWS.

NEW TORTRICIDS FROM KASLO, B. C., AND THE NORTHWEST.

BY W. D. KEARFOTT, MONTCLAIR, N. J.

Through the courtesy of Dr. Harrison G. Dyar I have had the privilege of examining and assisting in the identification of all the specimens of the family *Tortricidæ* collected and bred by him and his assistants during the past summer at and in the vicinity of Kaslo, B. C. A complete list of all species will be included in Dr. Dyar's comprehensive paper on his summer's work, which is in course of preparation. All of the species that appear to be unknown are described in the following paper. Prof. C. H. Fernald has very kindly read over the MSS. and examined the types, and confirmed my generic determinations, and in the case of one species made a correction, for all of which I am glad to acknowledge my obligation.

Cydia arctostaphylana, sp. nov.—Head, palpi, thorax and fore wings magenta, thickly sprinkled with grey, the latter predominating on inner side of palpi. The grey and magenta scales alternate along inner two-thirds of costa. Cilia of fore wing magenta inwardly margined by a delicate line of grey scales. Hing wing light shining fuscous, cilia same. Under side fore wing dark, smoky fuscous. Six or seven pale spots on costa, in each of which are a pair of dark brown costal spots. Cilia dark shining grey, tips magenta. Under side hind wing dark fuscous, with a row of whitish spots on costa. A small black crescent margining apex, and a series of faint, darker fuscous lines paralleling outer margin on outer half. Cilia light shining grey, inwardly outlined by a row of darker fuscous scales. Abdomen light fuscous, anal tuft tinged with brown; under side darker fuscous, with shades of magenta. Legs grey, outside and tibiæ shaded with magenta.

Var. A.—Ground colour nearly same as above, but more of a coppery-magenta. Palpi, only magenta on outside, upper edges and inner sides grey. Head grey, with only a trace of magenta. Thorax magenta. Fore wing: grey scales, mixed with black, almost entirely hide the magenta on the dorsal margin; a darker shade in the anal angle, and a narrow band of nearly black scales, sprinkled with grey, outline the cilia along the outer margin before this; at and above anal angle are a few dark brown scales, overlapping the dark line; along the costal are a number of whitish or light grey spots, alternating with dark brown. Cilia dark smoky-grey, sprinkled with a very few light grey specks.

Var. B.—Ground colour same as last two, but the dorsal band of Var. A in Var. B is a broad band, one-third width of wing, of whitish scales, interrupted and mixed with black, the outer and costal margin are the same, but narrower, leaving the ground colour in only the middle of the wing, forming a broad band from base to just before outer margin. Palpi dull black, tips of scales greyish-black, sprinkled with lighter; under side grey. Head dark fuscous, scales very long, projecting well above and in front of eyes in the form of ruffs. Thorax and patagia the same, but more mottled with lighter fuscous shades. Fore wing magenta, well sprinkled with whitish scales, these are more concentrated at outer third, below costa, and at apex shading into and obliterated by whitish and brownish fuscous scales. Costa from base to apex, alternate short patches of blackish-brown and whitish scales; this line is only on costal nervule. Scales on dorsal margin, whitish or very pale grey, forming a band extending upwards one-third width of wing; upper margin irregular, well defined and not gradually shading into ground colour. A conspicuous dark brown spot at inner and outer third on upper edge of this band, and a number of small spots of same colour touching dorsum, and three small patches between the inner large patch and base; other small patches of dark brown occur, making it appear mottled. Before outer margin ground colour shades into light grey and fuscous, the latter forming a narrow line, succeeded by a paler one, and beyond this another dark line just before cilia. The latter is dark fuscous, mottled with lighter dots, and at anal angle pale fuscous.

Described from 13 specimens. Seven nearly immaculate, and three each like varieties A and B. Alar Exp., 17 to 18 mm.

Bred by Dr. Dyar, Kaslo, B. C., on *Arctostaphyla* sp., and collected Platte Canon, Col., Aug. 24 to Sept. 11. U. S. Nat. Mus., Type No. 7786.

Cydia pseudotsugana, sp. nov.—Head fawn colour, the scales standing separately, and giving speckled appearance, by darker shades at their bases; face darker. Palpi, fawn colour inside and at base outside, shading into dark brown; terminal joint bare, projecting its full length beyond tuft of second joint, blackish-brown, a dot of fawn on extreme tip. Thorax and patagia same as head, very dark brown beneath, irrorated with fawn-colour tips of scales. Fore wing, shades of whitish grey, fuscous and black. The basal patch occupies a little more than one-third the length of wing on the median line, angling sharply inwards to costa and dorsal margin, both of which it reaches at the inner fourth. Ground

colour greyish white, almost evenly spread dark brown and black, the dark colour is concentrated in three dots on fold, the middle one extending in a line nearly to dorsum, and beyond these a dark oblique line, defining the basal patch to median line, thence abruptly angling inward nearly to, but not reaching, dorsum. A small dark dot on costa between this line and base ; on lower half are scattered light brown scales. A dark broad band begins on costa, just beyond middle, as a small dot, but broadens just below costa and ends on dorsum before anal angle. The inner and outer edges of this band are irregular, with three distinct rounded projections on the outer and the same number of rectangular projections on the inner edges. Scattered over this band are a few whitish and reddish-brown scales, the former predominating above and the latter beneath the median line. Between this band and the basal patch the colour is more whitish than basal patch, appearing as a paler band, interrupted by a concentration of dark scales, forming a short horizontal line about a third below the costa, and a dark dash on costa in centre of light area ; a broader band of darker scales begins about median line and proceeds obliquely inwards towards, but not quite reaching, costa. The lower half of this light area is a conspicuous patch of almost white scales, in the centre of which is a small patch of light brown. Beyond the central dark fascia the ground colour as light as between basal patch and dark fascia ; a conspicuous rounded subapical patch of dark scales defines the pale area and causes the latter to appear as a whitish band from costa to anal angle. On the costa are four evenly-spaced dark dots, the inner in the centre of the whitish fascia, the outer on the apex, and the one before the apical spot is confluent with the sub-apical dark patch. On both the pale area and dark patches are scattered light brown scales ; a line of almost black scales precedes the dark lead-coloured cilia. Hind wing smoky-fuscous, under side same, but darker on fore wing, the costa of latter marked with geminate whitish dots, continuing over from the upper side. Abdomen grey, paler beneath ; legs same as under side of abdomen, shaded with fuscous and annulated with dark brown. In some specimens the light brown scales are missing, this may be due to rubbing, as these scales seem to be longer and less firmly rooted, but they are not long or erect enough to be classed as raised scales. Alar Exp., 17 mm.

Twenty-three specimens, collected by Dr. Dyar at Kaslo and Kokanee Mt., and taken torpid on the snow of Kitchener Glacier about

Aug. 10; also bred by him from larvæ taken June 24 on *Pseudotsuga* sp. U. S. Nat. Mus. Type No. 7788.

Proteopteryx Columbia, sp. nov.—Head clothed with long brown scales. Palpi same colour, paler beneath and inside, point of apical joint fuscous, scarcely projecting beyond tuft of second joint. Thorax, closely appressed smoky-black scales, very minutely sprinkled with brown. Patagia same, tips of scales light fuscous. Fore wing, greyish fuscous, marked with black streaks and dots and heavily overlaid, especially on lower half, with reddish-brown scales of several shades. Basal patch not distinctly defined, costal fold one-quarter length of wing, mottled grey, black and pale reddish-brown. Beyond fold on costa are five large oblique dashes, between each is a smaller dot, all black, but bordered by bright reddish-brown scales, between these dots and dashes the scales are nearly white, the outer dash is on the apex; below the third and fourth dashes is an irregular short horizontal black streak, divided into two fine lines at its outer end by a concentration of bright reddish-brown scales, the latter scales form a ?-shaped mark, with the upper edge of the rounded part bordering the black streak, the upper point running into outer margin and the lower point nearly to anal angle. A larger, somewhat oblique horizontal streak begins just beyond middle of wing, and ends beyond end of cell, a few reddish-brown scales are sprinkled over it, below it and reaching to dorsal margin is a large, roughly-triangular patch of mixed pale brown and reddish brown; this colour continues on dorsum to anal angle, but before reaching it and defining an ocellic spot the brown scales project upwards and merge into a small black dentate streak. The scales on the outer half of wing, between these black and brown patches, have a very pale bluish-white appearance. The lower and inner quarter of wing is heavily overlaid with brown scales, a shade darker than the brown dorsal patch, into which they merge. The extreme dorsal margin is dotted with black. There is a broad outer marginal line of evenly-mixed fuscous, gray and brown scales, this line bends sharply outwards above the marginal notch, which is opposite 3, 4 and 5. Cilia brownish-fuscous, long, a few long scales of black at lower end, inside anal angle. Hind wing smoky fuscous, darkest on apex. Cilia a shade lighter, under side same, but slightly paler. Under side fore wing dark smoky fuscous, darkest at apex, five white dots on costa, each enclosing a smaller black dot. Abdomen grey, anal tuft light brown. Legs light grey, tinged with pale brown.

In another specimen the pattern is the same as the above, but the ground colour is more uniformly a bright or steely grey ; the brown scales are nearly entirely absent, and the clothing of the head and palpi is almost white, but faintly tinged with yellowish-brown or very pale fawn. On the thorax of this specimen are three small pure white dots, one on each side, the result of the extreme ends of the scales of the patagia being white, and one on posterior edge, caused by the tips of the thoracic scales, which partly overlap first abdominal segment, being white.

In another specimen the reddish-brown scales cover nearly all of the lower half of the fore wing, and in other specimens these scales are coppery-brown, and in others pale brown or fawn colour. The species seems to be quite variable, but a fairly constant characteristic of all that I group under the name *Columbia* is the pair of black patches on the outer half of fore wing, one before apex, parallel to and just below costa, and a larger one also parallel to costa, but on a lower level, covering end of cell. These two streaks, with the smaller one on the apex, make three steps, each nearly an equal height above the other.

Besides the above there are two very differently marked varieties which show no intergrades, and are entitled to varietal names ; they may possibly be distinct species, as Dr. Dyar's breeding records of this group are not entirely satisfactory to him.

Proteopteryx Columbia, var. *albidorsana*, var. nov.—Head well clothed with long smoky-black scales. Palpi fawn colour, speckled with blackish, the latter predominating on end of tuft, and paler fawn on inside. Thorax black, with a few very minute brown specks. Fore wing dark chocolate-brown ; basal patch smoky-black, about half length of costal fold, convex outwardly. On the dorsum, defined on the inside by the basal patch, is a broad white band, the upper edge is excavated deeply just beyond its inner end by the ground colour, beyond this it extends upwards to a sharp point at about the middle of the cell, thence curving downward and again upward, terminating in a sharp point on middle of wing, just beyond end of cell ; the ground colour below this forms a triangular patch on dorsum, just before anal ocellic spot, the base of the triangle rests on dorsal margin at and before anal angle, but leaves margin and indents white area, causing the latter to terminate outwardly in two points. The ocellic spot is a hemispherical patch of these same white scales, but a shade less white.

In other specimens the white dorsal area is replaced by fawn-coloured scales. On the costa, beyond the fold, are five pairs of greyish-blue

oblique streaks, lightest on the costa. A streak of black begins on apex, and proceeds parallel to costa to about middle of cell, interrupted at half its length. An obscurely black streak on median line, between basal patch and inner third, a few black scales overlaying white patch, on dorsal margin before inner third. Outer margin and cilia dark fuscous, a black dash in cilia just below apex. Hind wing dark smoky-brown, cilia darker. Under side fore wing dark smoky-brown, cilia lighter; five geminate whitish spots on costa. Under side hind wing and cilia fuscous. Abdomen, upper side same as thorax, black, with a few very minute brown specks, anal tuft purplish brown. On the second or third abdominal segment is a flattened tuft of long scales. Under side of abdomen and legs light fuscous, latter annulated with black and speckled, same as upper side of abdomen and thorax.

Protopteryx Columbia, var. *mediostriana*, var. nov.—Head brown, mixed with lighter and darker scales, mottled. Palpi mottled-brown outside, nearly white on inside and apex. Thorax smoky-black, very minutely speckled with brown; patagia with white spot on posterior end. Fore wing, ground colour very uniformly mottled bluish-grey, fuscous and black scales, with a few brown scales in patches and streaks. Beginning at base on median line and extending to outer margin just above anal angle is a pinkish fawn-coloured streak, slightly wider at outer end; a second streak of this same colour begins at base, but only extends to inner third, below and parallel to the long one, they are joined together at base. A number of geminate whitish dots on costa. Hind wing smoky fuscous, cilia fuscous. Under side, fore wing smoky fuscous, with geminate whitish dots repeated on costa. Hind wing fuscous, darker before apex. Abdomen very dark fuscous; under side paler. Legs fuscous.

Described from about 60 specimens, of which ten per cent. are var. *albidorsana* and the same number var. *mediostriana*. Bred by Dr. Dyar, Kaslo, B. C., on willow (?), and collected by Dr. Taylor, Wellington and Vancouver, B. C., and by Mr. Bryant, Wellington, B. C., latter part of February to latter part of March. U. S. Nat. Mus. Type Nos. 7789, 7790 and 7791, respectively.

This species is nearest to the European *Protoepteryx crenana*, Hbn., inasmuch as both are extremely variable; all of the British Columbian specimens are larger than *crenana*, the general colour of the latter is brighter and less sombre, and the hind wings of *crenana* decidedly lighter. I have no knowledge of the variety *mediostriana* occurring at all in Europe.

Named in honour of the earnest and hard-working Entomologists of the British Columbia district.

(To be continued.)

NEW TORTRICIDS FROM KASLO, B. C., AND THE NORTHWEST.

BY W. D. KEARFOTT, MONTCLAIR, N. J.

(Continued from page 114.)

Enarmonia Cockleana, sp. nov.—Palpi pale fawn, tipped with black. Front of head or face very pale fawn, top of head and thorax a shade deeper. Fore wing rich reddish chocolate brown, by refracted light, scales prismatic, like burnished copper. A broad fawn-coloured fascia from costa at inner third obliquely to dorsal margin beyond half. A second oblique fascia parallels the first, begins on costa at outer two-thirds, and ends at anal angle; this is broader on costa, and lower half is not so well defined. The inner fascia is nearly straight on inner margin, which is sharply defined by a line of shining pearl-white scales, interrupted three times; the outer edge of fascia is indented by four similar pearl-white patches projecting outward over the brown ground colour. The upper pearly-white spots do not touch the costa, but the lower ones are on the dorsal margin. The outer fascia is not so conspicuous as the inner. On its inner edge is a line of pearly-white scales beginning on the costa, interrupted the middle of its length, and terminating just above the anal angle. On its outer edge is a small pearl costal spot, below this a short vertical streak. Just before the outer margin is an irregular row of five small pearly-white spots. The last named and the lower streaks on outer fascia have a metallic blue reflection. The base of wing to inner fascia and the space between the two fasciæ is thickly sprinkled with fawn-colour scales. Costa, to outer fascia brown, sprinkled with fawn, with four pure white dashes or patches beyond; the first is geminate, and with the second, is in the outer fascia, the third makes an extension of this fascia, and the fourth between third and apex. The fourth is narrowly lined before and beyond with black, and on it is the upper of the submarginal row of pearl-metallic-blue dots. Costa between third and fourth white patch and beyond latter to apex is black. Beneath this black, at apex, is an ovate spot of ochreous-brown, enclosing a darker brown dot. Cilia white below apex to middle, below this and around anal angle fuscous. Hind wing and under side both wings dull metallic dark fuscous, or dark-coppery-fuscous. Cilia lighter. Abdomen, upper side dark shining gray, anal tuft yellowish brown or fawn, under side same as tuft. Legs same. Tarsi with dark annulations. Alar exp., 12 to 13 mm.

May, 1904.

Twenty-eight specimens, twenty-six collected and bred by Dr. Dyar, Kaslo, B. C. Larvæ June 17, on willow, issued and flown specimens July 25; and two specimens taken by Dr. Barnes, Aug. 9, Banff, Alberta. U. S. Nat. Mus. Type No. 7787.

Named in honour of Mr. J. W. Cockle, the enterprising and indefatigable collector who is making Kaslo famous.

Acleris Britannia, sp. nov.—Head light brownish fuscous, tips of scales shaded with deeper brown. Palpi fuscous, beneath and inside, brown outside. Antennæ fuscous beneath, reddish brown above. Thorax ochreous brown, with scales arranged in a tuft. Fore wing ochreish-brown. Costa at base dark brown. A faint brown outwardly-curved oblique line begins at costa at about one-fifth, touching dorsal margin at one-quarter. Parallel to this line is a second brown line, beginning on costa at two-fifths and touching dorsum just beyond middle. The space between these two lines is paler than the balance of wing, forming a well-defined oblique fascia. The usual triangular costal patch begins at this second line, and is unusually large and dark. It extends along costa to but not touching apex, more than half length of costa, and the lower point nearly to centre line of wing; colour of patch rich dark coppery brown, roughly arranged in parallel oblique rows, between the rows brownish fuscous; heavily overlaying the patch are clusters of dark gray scales. These are particularly grouped at the lower point, just beyond inner point, and before outer point, and a row of dots below but not on costa. The costa along the patch is paler. Tips of scales, on outer margin, overlapping, cilia are darker brown, forming a fine marginal line.

There are a number of dots of black raised scales; the largest and highest is just above dorsum, on the inner of the above parallel lines, on the outer of these lines five or six small clusters, the cluster in centre the largest, the lowest one is on the dorsal margin, another small dot is just beyond this and just above the dorsal margin. Seven small clusters form an acutely outwardly curved line, its upper end beginning in the dark costal patch about half way between the lower and outer points of the patch, and curving outward towards outer margin, thence evenly and regularly curving to the anal angle. Another dot is below outer end of costal patch and before apex. The ground colour of the fore wing is more of a tawny yellow than ochreous brown; under a low-power lens the ground colour is seen to be a series of wavy lines, alternately tawny yellow and a lighter cinereous yellow. These lines are generally parallel and

oblique. They are an entirely independent ornamentation to the lines, spots, etc., in above general description. Cilia same as ground colour, tinged with fuscous, and bordered on the inner side by a thin brighter line. Hind wing very pale ash gray, with a reticulated effect on the outer half, and especially the apical third, caused by a series of parallel brownish fuscous lines, broken into short dashes. Cilia long, concolorous. Under side, fore wing shining fuscous, with the lines and dots of upper side repeated by darker fuscous. On the inner half of costa are several oblique dark fuscous dashes. Cilia concolorous, shading into brown at extreme edge and apex. Under side, hind wing same as upper side. Abdomen fuscous. Legs fuscous, annulated with dark fuscous on last joint.

The type described above is like the majority of the specimens before me. Two extremes may be noted.

In one, A, the costal patch is so heavily overlaid with nearly black, slate-coloured scales, that the ground colour is entirely hidden, except a line along the costa, and a small enlargement of this line in the middle of the patch. .

In another, B, the general colour is lighter all over, with barely a trace of the dark slate scales in the patch. In this specimen the wave-like lines of the ground colour are not nearly so well defined, but the lighter and darker scales are broken up into small patches ; one is particularly well marked, near base on dorsum, and surrounding the large dot of black raised scales.

The general appearance of all specimens is much the same, these differences only becoming prominent through a lens. Alar exp., 17 to 19 mm.

This species is close to the European *Acleris aspersana*, Hbn., but is quite distinct, especially larger average size, pair of basal lines absent in *aspersana*, and hind wings of latter are evenly smoky fuscous, no lines or reticulations.

Described from 23 specimens, 16 from Kaslo, B. C., collected by Dr. Dyar, also bred by him on rose, and 6 specimens collected by Dr. Taylor and one by Theo. Bryant in the vicinity of Wellington and Victoria, B. C. I have also seen one specimen in the Museum of Comp. Anat., Cambridge, labelled " B. C.," and I have so named it after British Columbia.

Larva taken July 21. Moths emerged and dates of capture, July 31 (Bryant), Aug. 20 (Taylor), and Sept. 5 (Dyar).

U. S. Nat. Mus. Type No. 7784.

Acleris fragariana, sp. nov.—Head and palpi dull smoky black, tips of scales gray, giving a mottled appearance, prothoracic legs and under side of thorax the same; the gray colour predominates on inside and under side of palpi. Thorax, patagia and fore wings yellowish brown. Scales on thorax long, arranged in a well-defined tuft. Fore wing: the inner half, including the base, is of ground colour, mottled by four evenly spaced, transverse, narrow, interrupted bands of a shade darker brown. The dorsal margin, within this space, beginning just beyond the base, is overlaid with dark blue-gray scales, formed into short vertical bars, between the bars the ground colour is darker brown. This dorsal band extends out to anal angle, but merges beyond the middle with the darker outer half. The latter is sharply defined by line beginning on costa, just before the middle to the dorsum, oblique and curving slightly outwards. The lower two-thirds of this line is of darker brown raised scales. Adjoining this line outwardly is a band of mixed rust brown, gray-blue and dark brown scales; in this band, where it touches costa, are two small dark brown costal spots; this oblique band continues down and merges into dorsal dark band; beyond this band on the costa is a small triangular patch of ground colour scales, with a short oblique streak of dark brown on costa just before outer end of patch. Beyond this on costa, and just before the apex, is an almost circular patch of dark gray-blue scales, bounded by short raised scales tipped with black. Below this circular patch the general colour is lighter, the lighter colour circling the patch on outer side and running up to costa at apex. Beginning at apex and continuing to outer margin, just above anal angle, is a perfectly straight vertical line of black raised scales, interrupted by a short break one-third below costa; and opposite this break, closer to outer margin, is a short line of the same scales, slightly overlapping the inner line at the lower end, and continuing up to apex, roughly margining the cilia. At the inner third, just above dorsal margin, on lower median line, is a large cluster of raised scales, dark brown mixed with black; above this, a little nearer to base, on median line, is a small cluster of brown raised scales, with a black dot in centre; a third small cluster is between these two, but a little beyond them. These three clusters are all on the inner yellowish-brown half of wing, the first mentioned and largest resting on the dark dorsal band. Cilia long, mottled light and dark brown at apex, with a scale or two of black. This colour continues to middle of outer margin, where it gradually

merges into blue-gray, which latter colour is solid at and around anal angle. A faint line of this gray runs up through centre of cilia to apex. Hind wing shining light fuscous, cilia same. Under side fore wing: inner half pale yellowish brown, lighter than upper surface; outer half light lead colour, a dark brown, short, oblique dash on costa at inner fourth, and a small black dot at middle of costa. Apical portion of under side and cilia mottled with brown, and the colour of the raised scales of upper side are repeated. Under side hind wing very light fuscous, marked by a few brownish black broken lines, paralleling outer margin, in apical and costal regions. These lines are faintly visible from the upper side. Abdomen: above shining fuscous, anal tuft faintly tinged with brown; under side same, but a shade darker. Meso- and metathoracic legs dark gray on upper joints; outer cinereous, annulated with dark brown. Alar exp., 14 to 15 mm.

Described from four specimens, bred on strawberry, at Ellensburgh, Wash.; forwarded by S. W. Maxey, through F. H. Chittenden. Issued Aug. 22.

U. S. Nat. Mus. Type No. 7785.

Commophila fuscodorsana, sp. nov.—Head white, shaded with brown on the sides. Palpi and thorax white. Fore wing pure white, except basal patch and band on dorsal margin, nearly one-third width of wing, extending two-thirds length of wing, and at outer end merging into a patch covering lower end of cell, greenish fuscous; overlaid along dorsal margin with striations of pearly white. On the extreme dorsal edge the fuscous is interrupted by a row of pure white dots. At apex are two short rounded lines of dark greenish fuscous, one margining the cilia and one paralleling it just before apex, both touching costa. On the costa at middle of wing are two pale greenish dots, below these a shade of light yellow, running into or forming a continuation of the fuscous patch terminating the dorsal band. The faint vertical streaks of very pale greenish fuscous traverse the white outer third between the dorsal fuscous patch and apical lines. Cilia white, except at apex, fuscous. Hind wing light fuscous, cilia paler. Under side fore wing smoky fuscous, darker at apex; hind wing light fuscous. Abdomen yellowish fuscous, anal tuft lighter, legs same. Alar exp., 18 mm.

Described from two ♂ ♂, one Kaslo, B. C., June 7, J. W. Cockle; one Fieldbrook, Cal., May 21, H. S. Barber.

Type, U. S. Nat. Mus., No. 7876.

THE CRICKETS OF ONTARIO.

BY E. M. WALKER, B.A., M.B., TORONTO.

The crickets, or Gryllidæ, like the other families of Orthoptera, have received so little attention from Canadian entomologists that very few species have been reported from the country, and most of these few records are of little value, as they were made at a time when the family had been little studied, and the species were ill defined. Much has been done of late, however, by American entomologists, notably Scudder and Blatchley, to unravel these difficulties, although the family is still a very difficult one to deal with, and much patience and close observation is necessary in order to separate the species satisfactorily. As the writer has paid a good deal of attention to the Orthoptera for the past ten years, a number of species of crickets have been added to the Ontario fauna, and the following notes upon these species may serve as a guide to the further and more complete investigation of the species of Gryllidæ in this part of the country.

Briefly, the Gryllidæ may be characterized as follows: They are jumping Orthoptera, in which the body is more or less depressed. The wing-covers lie flat upon the dorsal surface of the body, with the outer part bent abruptly downwards at the sides. The tarsi are 3-jointed, without pads between them, and the fore coxæ are longer than broad. The antennæ are usually long and filiform; the hearing organ, when present, is situated at the base of the fore tibiæ, and the shrilling organ of the male is near the base of the tegmen, and is longer and broader than in the Locustidæ. The ovipositor when exposed is long and spear-like, and apparently consists of two lateral pieces, grooved internally. Each of these pieces, however, is made up of two separate parts closely fitted together. A tube is thus formed, down which the eggs are passed during oviposition.

Three subfamilies of Gryllidæ are represented in Ontario, the Gryllotalpinæ or mole crickets, the Gryllinæ or ground crickets, and the Œcanthinæ or tree crickets. These subfamilies may be separated by the following table, which, with the succeeding ones, has been taken from Blatchley's excellent report on the Orthoptera of Indiana (27th Ann. Rep. Dep. Geol. Res. Ind., 1902), such changes having been made as were necessary to adapt them to the Ontario fauna. I am also indebted to Mr. Blatchley for the loan of specimens, and for his kind assistance to me in the determination of difficult species.

May, 1904.

A NEW GENUS OF SPIDERS.

BY THEO. H. SCHEFFER, A.M., MANHATTAN, KANS.

Family Thomisidæ : Subfamily PHILODROMINÆ.

Philodromoides, gen. nov.—Cephalothorax low, about as wide as long ; head region much narrowed and slightly elevated. Abdomen fully twice as long as wide, very little wider behind than at the base ; somewhat pointed at the end ; the base projects a short distance over the cephalothorax, and is distinctly notched on the upper side. The sternum and labium are about as in *Philodromus*. All eyes approximately equal in size ; the anterior row much the shorter and slightly recurved ; median eyes of this row farther from each other than from the side eyes. Posterior row also recurved ; side eyes of this row on larger tubercles than any of the others ; median eyes farther from each other than from the side eyes. Ocular quadrangle considerably wider behind ; about as wide as long. Clypeus wider than space between anterior median eyes, but not as wide as space between posterior median eyes ; obliquely directed forward and downward. Legs long and slender, the second pair longest, the third shortest ; the relative lengths are, in their order, second pair, first pair, fourth pair, third pair. The tibiæ of the first and second pairs are set beneath with ten or twelve stout spines arranged in two rows, and the metatarsi are similarly armed with half that number. Weaker spines likewise occur on the other two pairs of legs and on the pedipalps.

FIG. 8.

Philodromoides prataria, sp. nov.—Female. Length, 6 mm.; length and width of cephalothorax, 2 mm.; width of abdomen, 2 mm. Other characters as given in the generic description. A very few short bristle-like hairs scattered about among the spines on the outer joints of the legs and on the chelicerae and the pedipalps; thickest on the tarsi of the latter.

Coloration.—Abdomen plain brown above, mottled and streaked with a lighter shade. The four muscle impressions are quite distinct. Cephalothorax rusty-brown, lighter at the sides and just back of the head region. Streaks marked by depressed lines radiate from the dorsal groove. The sternum is pale yellow or almost white. The abdomen is lighter beneath than above, and there is a less mottled central region, set off by a row of indistinct dots on either side. The legs are pale yellow to whitish. The femora, patellæ and tibiæ of all four pairs are marked in front with a longitudinal stripe of black, which becomes nearly obliterated on the metatarsi and tarsi. The corresponding joints of the legs of the third and fourth pairs are similarly marked on the hind border also.

The males are somewhat smaller than the females, the abdomen being considerably narrower than the cephalothorax. The legs are more hairy in appearance and the spines less conspicuous than in the female. The colour markings are about the same in the two sexes.

This species is not uncommon about Manhattan, Kansas, in mid-summer. Mature males and females were taken in this locality on August 17. Types are in the collection of the Kansas State Agricultural College and in the National Museum at Washington.

A NEW PROTEOPTERYX.

BY W. D. KEARFOTT, MONTCLAIR, N. J.

PROTEOPTERYX WILLINGANA, sp. nov.

♂, 18 mm. Head, thorax, palpi, antennæ and fore wings, same shade of very light tan or pale brownish-fuscous, overlaid with a few blackish brown scales.

Palpi: outer joint short, obtusely pointed; tuft on second joint flattened and appressed, lower scales extending to outer end of outer joint. Head roughly scaled. Eyes black with coppery reflection. Antennæ annulated with fuscous and brown. Thorax smooth.

October, 1904.

Fore wing: just beyond base, above and below fold five small clusters of dark scales in an irregular ring, open towards base. A broad oblique central fascia is faintly outlined by two very scattering lines of dark scales, the inner from inner quarter of costa to inner third on dorsum, and the outer from middle of costa to dorsum before angle. Regularly and closely placed on costa are small clusters of dark scales, in short oblique dashes on the inner half, and short oblique lines on the outer half. A small subapical dark spot, and below it a submarginal cloud of darker scales between the latter and outer margin, obscurely merging into central fascia. The lower two-thirds of margin are almost entirely free from dark scales, and are of a pale yellowish-fuscous colour, except the ocellic spot above angle, which is white, overlaid with gray. Cilia same as fore wing, but slightly darker.

Hind wing pale fuscous, with darker fuscous scales below outer half of costa and at apex. Cilia same. All the space above vein 8 is closely and heavily clothed with rather short black scales; this is possibly a sexual character. Abdomen grayish-fuscous, anal tuft bright light brown. Legs yellowish-fuscous, shaded with light brown.

♀, 18 to 20 mm. Three specimens, each differing from each other only in degree of darkness, and differing from the male in the absence of the black subcostal streak on hind wing and in the addition of four clusters of raised scales on the fore wing, three subdorsal, evenly spaced, inner just beyond base and outer before angle, the fourth is above and beyond the latter.

Fore wing of palest ♀ contains less black scales than ♂ described above, and the lines indicating the central fascia are almost obsolete. There are three short parallel horizontal dark lines on outer margin below apex, and a fourth below them traversing the ocellic spot. White scales are rather freely scattered over the fore wing of this specimen, which under a low-power lens or with eye only, appears almost immaculate, of a pale tan colour, with basal area, a broad oblique band beyond central fascia and cilia a shade darker.

The markings on fore wing of darkest ♀ are well defined. The ground-colour is white and whitish-fuscous, with streaks and spots of yellowish-tan. The black scales are arranged as follows: A short vertical streak just beyond base connects by a line in the fold to a parallel vertical streak inclined inwardly, neither touching dorsum. A rather large

quadrate costal spot at inner fourth and below and beyond it, but separated by ground-colour ; another quadrate spot, above and defining the middle cluster of raised scales ; these two spots form the inner boundary of the central pale fascia. At centre of costa an oblique line goes to lower median vein, thence curves outwardly, then upward into apex, is broken just before apex by ground-colour, and sends off two straight horizontal lines into margin. The first upper half of this line forms the outer definition of central fascia, the lower half of which is defined by a short horizontal streak and three small dots. The costal maculation is less distinct on this than the more obscurely-marked ♂, and the black-brown streaks of the latter are replaced by pale fuscous and yellowish-fuscous. Ocellic spot in anal angle is an inverted U of pure white scales, yellow in the centre and broken by a horizontal fuscous line through outer leg. Subciliate line dark fuscous, cilia yellowish-fuscous.

Described from one ♂ and three ♀'s bred by Mr. T. N. Willing, Regina, Assa., in whose honour the species is named, and kindly forwarded for determination by Dr. James Fletcher, who states that the species is likely to become of rather considerable economic importance in the North-west, as the larvæ are gall-makers on the twigs of *Negundo aceroides*, Moench. (*Acer negundo*, L., of Britton and Brown), the box elder. No doubt a more detailed account of the work of this insect and description of the larvæ will be given in one of Dr. Fletcher's annual reports. The labels on Mr. Willing's specimens state the moths issued July 2 to 7.

The genus *Proteopteryx* was erected by Walsingham*, with *emarginana*, Wlsm., as the type of the genus. Fernald† has recently pointed out that *emarginana* has a costal fold, mention of which was omitted by Walsingham, hence a costal fold in the ♂ must be added to the characters of genus *Proteopteryx*.

This species *Willingana* agrees in venation and other characters with Walsingham's original definition of the genus, but the ♂ has no costal fold ; hence it, with some others of the species now placed under this genus in our lists, will, when furthur study has been given the subject, be separated from *Proteopteryx*.

*Ills. Lep. Het., Br. Mus., IV., 68, 1879.

†Can. Ent., XXXVI., 120, 1904.

Mailed Sept. 30th, 1904.

with the Pacific coast Barid fauna in general. It now seems probable that, like *Xystropus Californicus*, of Horn, the *Centrinus lineellus*, of Le Conte, is an adventitious importation from Central America, which should be removed from the list of our native Coleoptera.

The genus *Plectromodes*, Csy. (l. c. VIII., p. 829), is a synonym of *Sternechus*, Sch., previously supposed to be entirely tropical, and the genus *Copturodes*, Csy. (l. c. IX., p. 669), is a synonym of *Cylindrocopturus*, published by Heller two years before.

COLEOPHORA TILIÆFOLIELLA, CLEM.

BY W. D. KEARFOTT, MONTCLAIR, N. J.

This species was named by Clemens* from the larval habit and food-plant only. He did not publish a description of the moth, nor, so far as I am aware, has any one else bred it, until very recently Mr. Arthur Gibson rediscovered the larvæ on basswood.

The case is of the so-called pistol-shape, of about same size and hardly differing from the well-known pistol-case on apple†, excepting that the side wings are less expanded or more closely appressed.

The following is a description of the moth :

Head, thorax and antennæ-basal brushes very light brown or pale fawn, face and under side of head whitish ; a collar of nearly white scales between head and thorax. Palpi whitish at base and beneath, gradually becoming pale brown at tips. Antennæ annulated with white and light brown.

Fore wing : Ground-colour at base and inner fourth of costa same shade as thorax, beyond and gradually increasing in intensity, overlaid with darker brown, becoming smoky black at apex. A line of white scales along middle of costa, and parallel, beneath a shorter white line, below this a few scattered white scales. Another narrow white line on costa, before apex. Continuing around outer margin to about the middle of the long dorsal cilia, the white scales of this marginal line project into the cilia. Cilia brown, gradually becoming smoky-black at apex. The tips of costa-cilial scales white.

Hind wing, cilia and under side of both wings dark smoky fuscous. Abdomen above dark shining fuscous, anal tuft, under side and legs whitish.

Exp., 14 mm. One ♀ specimen bred by Mr. Arthur Gibson, Ottawa, Canada. Larval case collected on basswood, June 21, 1904 ; issued June 30, 1904.

*Proc. Ento. Soc. Phila., Vol. I., p. 80, 1861.
†*C. malivorella*, Riley.

YUCCABORUS, Lec.

Y. lentiginosus, n. sp.—Rather narrowly elongate-oval, convex, black, shining, the elytra dull and with many of the punctures of the intervals surrounded by a pale yellowish-white modification of the surface, the punctures along each side of the pronotum also so affected; beak slender, parallel, straight, four-fifths as long as the prothorax, the antennæ inserted just beyond the middle, where there is a slight lateral swelling; punctures coarse and subconfluent; antennæ thick, the glabrous polished base of the club extending beyond the middle on the compressed sides, but confined to the basal parts on the narrow sides, the scape attaining the eyes, which are coarsely granulated, the individual facets very convex; prothorax not quite as long as wide, the sides rounded; apex much narrower than the base, transverse, feebly sinuate at the middle, the base rectilinearly truncate; punctures coarse, deep and rather close-set, polygonally crowded toward the sides; elytra a fourth wider than the prothorax, and more than twice as long, the sides parallel and straight, converging and rounded in apical third; humeri rather widely exposed at base, the angles rounded; striæ not very coarse, feebly impressed, coarsely and strongly punctured toward base, finely toward apex, the intervals each with a single uneven series of fine punctures; abdomen strongly and sparsely but only moderately coarsely punctate, strongly impressed in the middle near the base in the male; legs moderate, shining, punctate. Length, 8.5–9.5 mm.; width, 3.0–3.7 mm.

Texas (Brownsville). Mr. H. F. Wickham.

There is no described species in our fauna closely allied to this, as may be gathered from the table previously published by the writer (Ann. N. Y. Acad. Sci., VI., 688), but it belongs with *grossus* rather than with *frontalis*, though very much smaller than that species, and less coarsely sculptured. The singular small pale spots of the elytra are a distinctive feature; they are irregularly distributed over the entire surface.

NOTES.

I have recently received a Guatemalan species of *Centrinus*, which cannot be distinguished from *lineellus*, described by LeConte from a unique, said to have been taken in California. While drawing up a redescription of this species (Ann. N. Y. Acad. Sci., VI., p. 592), it was impossible to avoid a suspicion of some mistake in the locality, because of the tropical appearance of the species and its apparent lack of harmony

Notes on the Life History of Polychrysia formosa Gr.

By W. D. Kearfott.

At the Southern end of Greenwood Lake, N. J., May 20, 1901, while digging up some plants of large yellow Ladies' Slipper (probably *Cypripedium hirsutum* Mill.) I in some way disturbed the repose of a singularly shaped larva, which fell to the ground close to my hand ; the nearest plant was a low-growing huckleberry shrub, (probably *Vaccinium nigrum* Wood or *vacillans* Kalm) some of the leaves of which were enclosed in box with the larva, and as it freely ate them, I have no doubt it is the food-plant.

Not appreciating the rarity of the larva, the moth from which was later identified by Professor John B. Smith, I made no detailed description of it, but the following notes may be sufficient for others to recognize it if found :

Shape :—Like a much flattened triangle. The head is small, and each segment to anal end slightly higher than the one before it. The anal segment is three to four times the height of head and segment 2, and it ends in a vertical line, as if cut off with a knife at right angles to the body.

Color :—Pea-green, with whitish wavy dorsal band and whitish wavy circumferential bands around each segment. Length about 25 mm. Head bright green and very small.

About May 27th the larva spun a loose cottony cocoon of white silk and a day or two later pupated, The cocoon was loosely woven, roughly oval, about 25 by 20 mm. and consisting of an outer wrapper rather evenly woven, in which were inserted at about equal intervals a number (about 35) of tiny pure white knots of silk, the inner covering rather loosely woven, and the pupa was clearly visible through both. A fine ♂ moth issued June 14, 1901, the pupa still remaining in the cocoon.

Notes of larva skin :—Head 1.6 mm. wide by 2 mm. long, rounded, slightly bilobed or cleft by paraclypeal suture, lobes rounded, clypeus triangular, apex reaching to within one-third of top. Mandibles dark brown, four indentations making five teeth or points on each. Antennæ short. Setæ on head and

skin pale, very short, not longer than 1 mm. Neither prothoracic nor anal shield chitinous.

Pupa, from empty shell:—Fifteen mm. long to tip of cremaster; 4 mm. wide across thorax by 3 mm. thick. Abdominal segments tapering to a point. General shape slender and elegant. Head and eye-caps make a triangular anterior projection. Cremaster .75 mm. long, armed with two large hooks and four smaller ones.

Color of pupa whitish green, on upper side of thorax and dorsal side of all abdominal segments, except 12 and 13, is a black-brown patch, averaging 2 mm. in width, interrupted by a small clear spot on posterior edge of thorax; the same spots are repeated on first and second abdominal segments and on margin of patch about centre of thorax. On the last abdominal segment is a small dorsal spot of the same black-brown color. The appearance of this patch is, as if the pupa had been held for a moment, dorsum down, in cold-tar or pitch, and in very striking contrast with the nearly white color. Setæ on pupa very minute.

NORTH AMERICAN TORTRICIDÆ.

W. D. KEARFOTT, MONTCLAIR, N. J.

Genus **POLYCHROSIS** Rag.

This genus was enacted by Ragonot* for the reception of the European grape-berry moth *botrana* Schiff, and this species was made the type of the genus. Ragonot, however, omitted to give the generic characters, and as, so far as I am aware, no one else has done so, I add them below.

In 1871 Zeller† identified the American grape-berry moth as *botrana*, and all subsequent workers in this family have followed his conclusions; and in addition have lumped under this name a number of moths whose larvæ feed on very dissimilar food plants.

These identifications can perhaps be accounted for by the reason that all of the species are superficially alike, especially if slightly rubbed, and that seems to be the condition of the majority of the museum specimens I have examined.

With sufficiently long series of perfect bred specimens, however, it is easy to differentiate and even place the rubbed ones where they belong. During the past four years I have been successful in breeding a goodly number of moths from different food-plants, which will be referred to later. The most valuable assistance has been given by Prof. M. V. Slingerland, who has bred large numbers of the grape berry moth from each of its three broods and most kindly permitted me the free use of all the species lumped under this name in the Murtfeldt collection, which is deposited at Ithaca. I am also indebted to him for opportunity to study a number of European specimens of *botrana*, secured through Staudinger and Bang-Hass, and most important he has been good enough to make the beautiful photographs, which are reproduced on Plate XIX.

About twenty specimens were loaned by the National Museum, bred from several food plants and from widely separated localities.

From a very careful study of all of this material I am convinced the American grape-berry moth is specifically distinct from the European, the name *botrana* for our American form most therefore fall, and be replaced by *viteana* Clem.‡

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* Ann. Soc. Ent. Fr. lxiii, 208, 1894.

† Stett. Ent. Zeit. xxxii, p. 179.

‡ Proc. Acad. Nat. Sci. Phila. p. 359, 1860.

It is not at all unlikely that the European *botrona* will be at some time introduced in this country with imported grape vines, and obversely *viteana* may become a native of Europe. But, so far as I have observed, not a single specimen of the real *botrana* has been taken or bred in America. For the sake of comparison it is included in the synopsis and an description added, and for the same reason it will do no harm to have the name awhile longer in our lists.

It is rather peculiar that *botrana* is not recorded from Great Britain—this may be partly accounted for by the reason that most of the grapes grown in England are under glass—but it is hardly a sufficient explanation and the fact that a species common in the south of Europe should pass by England entirely and yet be found abundantly in our Northern States is of a much better argument for the separation than the lumping of the two forms.

The outline of the wings of all the American species here treated differ quite markedly from the European, as can be observed on Plate XX.

In Clemen's original description of *viteana*, it is stated that the larva feeds on the fruit of the grape in September and on the fruit of the wild raspberry in July; Clemens also cites sassafras as the food-plant of another specimen, which was not distinguishable, except from difference in color. The majority of Clemen's types are in the Entomological Section of the Academy of Natural Sciences, Philadelphia, in a remarkably good state of preservation, and among them are two specimens of this species, one is undoubtedly an American grape berry moth and compares exactly with the long series bred by Mr. Slingerland. The second specimen is two badly rubbed for identification. Dr. Packard* says there are two broods of the insect, both on grape. Dr. Saunders† gives a very good figure of the American species and states that there are two broods, the last in the grape-berry and the early brood in young shoots of *vernonia* and on the tulip-tree. Prof. John B. Smith‡ names thistle, grape, rose and sassafras as food plants.

In the U. S. Nat. Mus. collections are specimens bred from grape-leaves, grape berry, *liriodendron tulipifera*, *Vernonia novaboracensis*, seeds of *Rhus* and several specimens without names of food-

* Guide to the Study of Insects, 336, 1869.

† Insects Injurious to Fruits, 298, 1892.

‡ Insects of New Jersey, 493, 1899.

plant. In the Murtfeldt collection are specimens bred from grape-berry, seeds of *Ambrosia trifida* and seeds of *Rhus*.

Prof. Slingerland's investigations into this subject have resulted in abundant series of the fall or grape-berry brood, the first spring brood on the flowerets and recently set grapes and the middle brood in the green grape berries. Prof. Slingerland has been successful in discovering and breeding considerable series of both, the mid summer and fall brood on the American wild-grape, which specimens compare exactly with *viteana*. In my own collection are specimens bred from *Liriodendron*, *Vernonia*, *Eupatorium* and swamp magnolia.

After critical examination of all this material, over 100 specimens, I feel very positive that each of the food plants support a good valid species, that the different broods do not affect different plants, but that the entire circle of each species is confined to a single plant. This is particularly well illustrated by Prof. Slingerland's work, and in a very much smaller way by my own. In Staudinger's and Bang-Haas Catalogue are twenty species under this genus; we have been satisfied to lump all of ours under one name and that a foreigner.

For want of sufficient material I do not propose to make as many species as we have recorded food plants in this paper, but hope at some later time to be in possession of good series from all the broods from each plant, which will warrant such separation.

POLYCHROSIS Ragonot.

Polychrosis, Rag. Ann. Soc. Ent. France, lxiii, 208, 1894.
Polychrosis, Rag. Staud. and Rebel Catalog Lep. des Pal. Faun. ii, 109, 1901.
Polychrosis, Rag. Fern. Bull. No. 52, U. S. N. M. 449, 1902.

Antennæ in ♂ shortly ciliated, palpi short, do not extend beyond face, outer joint very short, obtuse, tufts on second joint closely compressed, truncate. Thorax with bifid, posterior crest, loosely scaled.

Forewing:—Costa evenly arched, apex rounded, outer margin obliqne, very slightly rounded; 1b strongly furcate at base; 1c reaching to and almost concurring with 2; 2 arising from three-quarters of cell; 3 and 4 not connate but arising closer together than 4 and 5; 3 bent sharply and 4 slightly downward beyond origin; 5, 6 and 7 arising at equal distances; 4, 5, 6 and 7 to margin at nearly equal distances apart; 7 to margin below apex, 8 and 9 arising close but not connate; 10 and 11 widely separated from each other and 9.

Hindwing:—With frenulum; uncas not developed; median vein hairy above near base; costa slightly arched to middle, slightly sinuate beyond; apex rounded; outer margin slightly rounded; dorsum same but sinuate between 1b

and 2; 1b furcate at base; 1c indicated by a slight fold or thickening; 2 from two-thirds; 4 arising closer to 3 than 5, all separate; 4 and 5 parallel; 6 and 7 connate.

From a European ♂ specimen of *botrana* Schiff. from Staudinger and Bang Hass, through the courtesy of Prof. M. V. Slingerland.

Synopsis of Species.

1. With large outer marginal patch of front wing indented above anal angle by a spur of ground color.....2.
   With this patch evenly rounded on outer edge; not indented below. **botrana.**
2. With inner half of front wing uniformly lilaceous or leaden-blue, crossed by well-defined narrow brown lines.....3.
   With inner half much mottled with reddish brown or grey.....4.
3. With ground color of outer half of front wing rich ochreous-brown. **liriodendrana.**
   With ground color of outer half of front wing pale yellowish brown. **viteana.**
4. With dark color of central fascia of front wing extending to dorsal margin. **rhoifructana.**
   With this dark color concentrated about and above middle of wing and not reaching dorsal margin..... **slingerlandana.**

Polychrosis botrana Schiffermüller.

Tortrix botrana, Schiff, Syst. Verz. Wien, 131, 1776.

Head:—Caps above eyes, the long scales of which meet at upper side of head, very pale brown, flecked and spotted with darker brown, the same color on outer and under sides of palpi. Face and outer sides of palpi whitish yellow or cream color. Eyes large, round and black. Antennæ annulated with cream color and brown.

Thorax:—Front half and shoulders of patagia, dark brown, merging into cream color, overlaid with brown scales in middle of thorax and ends of patagia. A tuft of long raised scales on posterior end of thorax dark brown, almost black and mixed with a few cream-color scales.

Forewing:—Whitish grey, replaced by pale lilaceous grey between fold and dorsum, below costa between half and outer fourth and a small subapical patch. One narrow band at inner fourth and a broader band at middle, of pale olivaceous-brown, interrupted by patches of black scales. A small triangular spot at apex, a large one before apex, two between the latter and the middle fascia, and three on costa between apical spot and fascia, of this same color.

Base:—Whitish grey, mixed with pale fuscous and lilaceous scales, with a few black scales on costa just at junction with thorax, and a few more forming a V-shaped mark on median line, with point of V touching thorax. Just beyond base begins a line or narrow band, black on costa to median vein, thence swelling out in a wide semi-circle to dorsum, black scales replaced at median by light brown, the same color where it touches dorsum. Between basal line and inner fascia whitish grey, with tips of scales darker or light fuscous, below median two small patches of lilaceous scales, each with a few black scales outwardly, and a small black spot on costa. Inner fascia at inner fifth, almost vertical, broad on

costa, contracted on both sides a third below costa, broadening out below, and again contracted at dorsum. Color as stated above, black scales on each side of fascia on costa, a ring of black in middle and a small spot on dorsum, with two dots just above it on outer edge of fascia. This fascia is broken by a narrow whitish line that begins just beyond base, over the vein 12 and disappears at middle fascia. Space between inner and middle fascia, whitish grey, this color outlining edges of both fasciæ, edging costa and dorsum, and a streak paralled to and above fold with a narrower streak half-way between latter and costa. Between these whitish streaks color is lilaceous. Two geminate dots on costa fuscous-brown. One geminate and one single black dot on dorsum and three black dots between costa and dorsum, one just below vein 12 touching inner fascia, the other two on outer margin, one a quarter below costa and other a quarter above dorsum. Middle fascia same width on costa as inner fascia, at upper median line broadening outwardly to twice this width, with a right angle spur at middle, of about same width, pointing towards apex, ending abrupting, from lower point of this projection the band sharply contracts to the same width as on costa, at about a quarter above dorsum, below this is a short rounded outward projection, another acute contraction, then a slight swelling and the outer line rounds into the dorsum, where it is narrowest. Color bright olivaceous-brown, the black scales are concentrated in a solid mass occupying all of the fascia between middle of cell to costal vein, involving all of the first outward process and the middle spur. A few black scales at costa on each side of fascia, a short streak of black on fold, a dot on dorsum and a short line and two dots in middle of fascia. A narrow band of ground color runs from fascia, paralleling costa, bending down before apex and ending in a triangular spot on outer margin below and defining apical spot, from this band four rectangular spurs touch costa, defining brown costal spots, the width of spurs and costal spots are about equal. About the middle of this band it joins a vertical band of ground color, slightly wider than the subcostal band, and at a third below costa separating into three branches, the upper branch curves to middle fascia and coalesces with subcostal band, outlining a small diamond spot of brown; the second branch reaches dorsum just beyond fascia, and is sharply indented on both edges above dorsum, the third branch, on outer edge, goes directly to inner angle, with outer edge branching at right angles and ending on outer margin at and above angle. These ground-color bands and branches are partially heavily overlaid with lilaceous-fuscous and lilaceous-blue scales, the former on second branch of lower band and latter on the whole of the subcostal band, more intensely at its inner and outer ends. The four spurs that touch costa are tipped with white on inner and two outer ones, and in each is a small dark costal dot. Two black dorsal dots in second branch and three or four single black or brown scales in central portion, which is the whitest; and a small dark dot on margin. Of the three costal brown spots the first beyond costa is almost entirely overlaid with black, the middle one less so and the outer only black on costa, the apical is larger than the costal spots, is right angled on the basal and dorsal sides, and rounded, following curve of apex outwardly, it is smoky brown, with a black dot in angle. Below is a large semi-innate olive-brown patch, inner margin vertical, slightly indented above, straight below, and outer margin evenly curved, touching outer margin from a little above angle to slightly above middle. Evenly shaded smoky brown, several black scales on outer edge. Cilia light brown or fawn, becoming smoky black at and above apex, divided by a paler line.

Hindwing:—Very pale fuscous or whitish, shaded with darker fuscous outwardly; cilia whitish, proceded by a dark fuscous line Abdomen fuscous above, paler beneath, anal tuft ochreous. Legs dark fuscous, annulate with white. Expanse 12 to 13 mm.

From ♂ and ♀ European specimens.

Botrana is different from all of the American species in having the large subterminal patch rounded outwardly and resting against the lower half of the outer margin, while in *viteana* and allied species this patch is distorted and broken by spurs of ground color; in all the American species a well defined spur enters the patch just above the anal angle, in some species separating the patch from the outer margin. *Botrana* is a much paler or generally lighter colored species than *viteana*. The basal area and inner half ashy grey, crossed by narrow olive green fascia at first quarter and two short ones from dorsum before it. The olive-green central fascia is not unlike an outline map of South America, with Brazil pointing towards apex, but with stem that would represent the Isthmus going vertically to costa. The hindwings are very much paler than *viteana*.

Polychrosis viteana Clemens.

Endopiza viteana Clem., Proc. Acad. Nat. Sci. Phila. 359, 1860.
Carpocapsa vitisella, Rathvon, Prac. Farmer, p. 170, 1868.
Penthina vitivorana Pack., Guide Study Ins., 336, 1869.

Head, thorax, palpi light brown, specked with darker brown, lower and outer sides and tips of palpi and posterior thoracic tuft dark brown.

Forewing:—Ground color, lilaceous-blue, middle fascia and large spots brown, overlaid with much black. Costal spots lighter brown. A dash of white about middle of outer third.

Base to middle fascia lilaceous-blue, inner fascia almost obsolete, represented by a narrow band of black scales, each fringed with light brown, from dorsum but not reaching costa by a quarter, three small spots and two small ones between them of brown-black scales on costa before middle fascia. And in the same space on dorsum four black dots, the dorsal margin narrowly overlaid with light fuscous, brown and black scales, causing a mottled appearance.

The middle fascia is evenly convex on its inner edge, and is of almost even width throughout, except at about middle of wing, the outer edge curves downward and outward at right angles to the band, and then turns abruptly upward to costa (in the curve thus formed rests the white oblique patch) from outer end of this branch the outer line of fascia continues inwardly oblique to costa, slightly indented, the lower half of fascia triangular. Color smoky-black on upper half, a small patch of same at one-third above dorsum, otherwise smoky-brown, lightest at dorsum. Before anal angle is a triangular brown spot. Above the angle an irregular rounded blotch of brown and black, indented at its lower outward corner by a spur of the ground color, its outline also broken by a spur of ground color on its outer upper edge. Apical spot flatly triangular. Ground

color of costal margin between fascia and apex, whitish blue, four brown costal spots in this space, the inner a mere outwardly oblique line curving into outer lower end of second spot, latter and fourth are triangular-oblique, third spot rectangular. Below these spots and above the white patch are scattered a few brown scales. Cilia bluish grey, darker at apex and light fuscous at anal angle Underside dark fuscous, whitish below fold, three geminated whitish spots on costa before apex, and a number of others on extreme edge of costa only, between these and base, cilia darker with narrow light subciliate line.

Abdomen smoky black, with metallic reflection, anal tuft silvery-white above, yellowish beneath, tipped with dark fuscous; underside abdomen whitish; legs same inwardly and between joints, outwardly smoky-black.

Hind wing:—Smoky fuscous, lighter towards base, darkest at apex, cilia paler; underside fuscous.

Larva:—9 to 10 mm. Cylindrical, rather robust, tapering from 4 to head and 8 to anal segment. Pale olivaceous-green, with a reddish or purplish tinge from food. Head flattened, slightly bilobed, luteous green on upper parts of lobes, discolored by brown in front; mouth parts and a horizontal dash on side of each lobe below middle black. Pro-thoracic shield large but narrow, luteous brown, bisected by pale green dorsal line. Thoracic feet black, green between joints. Tubercles plates moderate, a slight shade darker than skin, shining. Anal plate not chitinous.

First brood complete, from hibernating pupæ of the complete third and partial second broods; issues in May and deposits eggs in the flowers of the grape, larvæ feed on recently got berries. Second brood not complete, part issuing middle of July and depositing eggs on half-grown grapes, but some of the pupæ of this brood hibernate and do not issue until the following spring; this habit has been observed on both the cultivated and wild grape specimens. Third brood complete, issuing latter part of August and ovipositing on yearly full size grapes, larvæ completing growth and in pupæ by the latter part of September. Pupæ of all broods formed in a neat little flap or envelope cut out of edge or internal part of a leaf.

The ground color of *viteana* and the inner half specially well defined, is a leaden blue or lilaceous-blue, crossed by a narrow chocolate brown line at first quarter. The central fascia is more slender than *botrana*, its outer spur is sharply produced and in some specimens turning upwards towards costa and almost joining submarginal patch. Apical spot is larger and the costal spots before it are smaller than in *botrana*. Hindwings dark brown.

Polychrosis liriodendrana sp. nov.

Head, palpi and thorax light brown, or fawn color, tips of palpi and outer ends of scales forming posterior dorsal tuft dark brown. Antennæ dark fuscous, narrowly annulated with light brown.

Forewing:—Greyish blue, dorsal patch, narrow inner fascia, middle fascia and spots on outer third light brown.

Basal patch barely touches costa, obliquely to dorsum, involving one-fifth of latter, indented twice before median line, light brown at extreme base and blackish fuscous outwardly. The outer edge of inner fascia straight, oblique to fold, thence inwardly oblique to dorsum. On its inner edge it is less distinctly defined, the ground color overlapping it above the fold, below the fold it nearly coalesces with dorsal edge of basal patch, beginning at the fold, in the inner edge, a narrow dash of black scales points towards dorsum. The central fascia is roughly triangular, the inner edge nearly straight and slightly oblique, the outer edge points towards angle for half its length and then obtusely turns obliquely inward to dorsum, color light brown, clouded with dark brown directly on and a quarter below costa, a small black dot on outer margin at widest part; outlined on both sides, except the upper quarter, by whitish scales. Triangular anal angle brown spot lightest towards base, and dark brown running into smoky black at angle and in cilia. Large marginal patch is diamond shape, almost evenly colored dark brown, a narrow line of dark blue or black scales separating the upper part from margin. Above this the costal and apical spots of brown almost exclude the ground color, being separated from each other by narrow whitish bands, through the centre, of which run short narrow lines of blue-black scales. There are but three large costal spots, the inner the largest, roughly rectangular, with an outer spur running towards and almost joining the large marginal patch, the apical spot oblong, slightly pointed at upper and lower ends, light brown on costa, darker below, with an irregular vertical line of blue black scales. Lines of these same scales completely surround it, except where it touches costa, and a short space at apex. The two costal spots between the above are rectangular and less than half the size of the apical spots. Between these four spots short lines of blue black almost touch costa. On costa between middle fascia and first large spot is a small brown dash, with whitish scales on each side, between inner and middle fascia, on costa is a small brown dash and beyond it a small elipse of dark bluish scales, between them the scales are a shade paler than the ground color. Cilia light brown, shaded with smoky fuscous at apex, middle and anal angle, tips of scales white.

Underside smoky-fuscous, with six geminated whitish costal spots. Hindwing pale fuscous internally, becoming smoky-brown outwardly, darkest at apex, cilia paler; underside evenly pale fuscous, with a few dark scales at apex. Abdomen smoky-brown above, pale fuscous beneath, tuft on 12 yellow, on 13 white. Legs whitish, annulated with dark brown. Expanse 11.5 to 12.5 mm.

U. S. Nat. Mus., type No. 8150.

Bred from *Liriodendron tulipifera* L. Second or mid summer brood, larva July 2nd, pupa July 9th, issued July 21st, Montclair, N. J. July 10th to 18th, Washington, D. C. In N. M. are several specimens of third or winter brood, No. 149, also May 7, 1883. I have collected larvæ of this last brood as late as October 15th. The habit of the two broods observed is to spin a narrow text along one side of mid rib, close to the base, as larva grows this tent is extended

outward, increasing in width, until it may finally involve a lobe of the leaf.

The larva is well sheltered under this protection, and in a few cases I have found the mid-rib excavated for half an inch or more, the larva retiring into this tunnel when disturbed. The first spring brood may be looked for on the flowers as well as the leaves of the tulip tree. All of the cocoons observed have been made by cutting out and turning over a flap in side or middle of leaf.

Larva 10 to 11 mm. Cylindrical, less robust than *viteana*, slightly tapering, sordid green. Head yellowish brown, ocellic field and lateral dash on lobes black; mouth parts are slightly darker than head; pro-thoracic shield dark brown, thoracic legs black. Anal shield not chitinous.

This is the largest of the American species I have observed. It can easily be separated from others by the rich ochreous color of ths outer half and particularly the apical portion of wing. The subterminal patch is smaller than either of the two preceding species, and is nearly square or diamond shape with points vertical. The costal spots are rectangular in shape.

Polychrosis slingerlandana sp. nov.

Head pale brown; palpi same, darker outwardly, thorax same, sprinkled with dark brown dots, on thoracic tuft the dark brown almost hide the lighter color, except at tips; antennæ pale brown, annulated with dark brown.

Forewing:—Yellowish brownish-fuscous. Basal patch covering inner fourth of wing, brown, heavily overlaid with dark purplish brown, dark color concentrated on costa and dorsum at base and outer margin of patch. Patch is defined by narrow yellowish fuscous line, running obliquely from costa to median, then angled sharply downward to dorsum. Beyond this the outer portion of wing is a mottled mass of yellowish fuscous, brown and dark brown scales, with a few grey and white. There is no well-defined pattern as in the *grape* and *liriodendron* species. Beyond basal patch is an obscurely defined lighter fascia, broken on costa by a geminate central dark spot and a single spot on each side, the upper half of fascia partly overlaid with dark grey and lower half with yellowish fuscous. On the median line the fascia is interrupted by a horizontal black streak, which continues to end of cell and terminates in a small round dot, two other dots the same size are on the upper side of streak, with the spaces between equally divided. From the outer dot an irregular brown line runs obliquely inward, becoming more black than brown when it reaches dorsum at middle. The space enclosed by this line and horizontal streak is dark brown above and lighter below. A dark cloud on dorsum before angle, and between it and brown oblique line are a few scales of grey. Beyond it, before marginal patch, is a much broken band of grey scales from angle to median. Marginal patch large, semi-ovate from costa to angle, touching margin from middle to angle, inner edge nearly straight, where it touches costa it is light brown. Shading into very dark brown to middle and below middle lighter, in the lower half are two small round black spots,

vertical to each other, and above them in middle of edge of patch a third spot. The lower half of this patch is outwardly bordered by a narrow black line before the cilia. Beyond dark upper half of patch a faint brown line, interrupted by three whitish dots, and a fourth whitish dot beneath a black small apical spot, between the latter and cilia light brown. A generally paler triangular patch covers costa from just before middle to nearly to apex, bounded inwardly by darker fascia and horizontal dark median streak and outwardly by the generally darker submarginal space. This lighter area, inwardly below costa, is overlaid with a few grey scales, below which is an irregular patch largely mixed with whitish scales. On costa the light space is broken by two equally-spaced shades of darker scales, before the inner shade are two small dots of black. Cilia slaty-grey, outwardly shaded with light fuscous on lower half.

Underside:—Dark smoky-fuscous, veins darker, eight geminated whitish spots on costa; cilia fuscous, with a narrow subciliate whitish line; all the surface below the fold is whitish. Hindwing smoky-black, not shaded. Cilia paler. All surface above vein 8 whitish. Expanse 8 to 9 mm.

U. S. Nat. Mus., type No. 8151.

Bred from *Eupatorium perfoliatum* L. Larva July 6th and 9th, pupa July 15th to 20, issued August 2nd to 9th, Montclair, N. J. I have taken the larvæ of what I believe is the same species about the middle of September, but failed to carry them over the winter. Mid-summer brood tunnelling a passage in the young flower heads, slightly silk lined. The fall brood on the mature flower heads and soft seeds, tunnelling as with second brood. The spring brood can be looked for in young terminal leaves.

Larva 8 to 9 mm. Cylindrical, more robust than *viteana*, slightly tapering, olive-green. Head flattened, chestnut-brown; mouth parts darker brown, ocellic field, lateral dashes, thoracic feet dark brown. Pro-thoracic shield light chestnut brown, darker shaded on posterior edge. Tubercular plates moderate, nearly concolorous, shining. Anal shield not chitinous.

This and the following species are of a different style of ornamentation than the preceding. The ground of *slingerlandana* consists of a mottled mass of ochreous and brown, the lilaceous shades are almost obsolete; the fasciæ and spots are also very illy defined and are almost lost in the prevailing color. Hindwing very dark, smoky-black.

Named in honor of Prof. M. V. Slingerland, of Cornell Experiment Station, whose important economic investigation in the habits of the grape-berry moth, the results of which will shortly appear in a special bulletin, has been the stimulus for the present paper.

Polychrosis rhoifructana sp. nov.

Head and palpi yellowish brown, thorax darker brown. Antennæ dark fus-

cous, with narrow lighter rings between joints. Eyes black, with greenish reflection.

Forewing:—Basal patch large, occupying inner quarter of wing, mottled mass of smoky-black and lilaceous scales, the black forming an irregular fascia through centre of patch and also another on outer margin of patch, the scales of latter at dorsum becoming brown. Four black dots and four whitish dots on costa within this space, outer line of patch outwardly oblique, irregular and with an acute tooth projecting outwards at fold. Beyond basal patch is a broad whitish fascia, cream and yellowish scales on costa and lower half and lilaceous scales on upper half below costa, one large and two small black dots on costa and several black scales over the lilaceous area. Outer edge of fascia nearly straight. Beyond is a broad dark fascia narrow on costa and dorsum, but swelling out at middle in width equal to a quarter of length of wing; smoky-black scales in upper half, changing to yellowish brown on lower half. Beyond and outlining this is a very irregular whitish fascia, broad on costa and to middle of wing, then contracted and broadening out again to dorsum, where it reaches to anal angle. On costa, in middle of this fascia, is an oblong streak of smoky-brown scales, and a small rounded spot of same on dorsum, a few other dark scales are between these two spots. Submarginal patch is large and touches margin only at middle, smoky-brown, darkest at upper end; inner edge nearly vertical, outer edge evenly rounded, except at lower quarter where it sharply broken or indented by a round whitish spot, having a lilaceous center. Apical spot smoky brown, with cluster of darker scales in center; separated from submarginal patch by line of whitish and lilaceous scales. Three brown costal spots between apex and outer light fascia. Cilia smoky-fuscous, mixed with bluish lilaceous, with a narrow dark inner line. Hind wind dark smoky-fuscous, cilia lighter. Underside of both wings smoky fuscous, with fascia and costal spots of upper surface of forewing repeated in lighter and darker shades of fuscous. Abdomen above smoky-fuscous, tuft yellowish brown, below paler fuscous. Legs fuscous, ringed and spotted with dark brown. Expanse 10.5 to 11.5 mm.

U. S. Nat. Mus., type No. 8152.

In other specimens bred from Sumac the contrast in the whitish and dark brown fasciæ are not so pronounced, caused by the displacement of the whitish scales by lilaceous or brown. In fact I have very strong doubts of the authenticity of the records of these particular specimens. (Riley, No. 5492, Dept. Agri.) The probabilities are that grape and sumac larvæ have been mixed under this one breeding number.

I have not bred this species, and of the nine specimens before me all are from the hibernating brood, dates of issue December 28th, January 9th, January 28th and March 6, Nos. 3342 and 3343, Insectory, Wooster, O., Murtfeldt collection; January 2nd, January 12th, January 29th, No. 3257, Nat. Mus.; and May 16th and 17th, No. 5492, Nat. Mus., near Rochester, N. Y. All except last two were doubtless forced, leaving middle of May as natural date of

emergence. In Prof. C. V. Riley's unpublished notes at Dept. Agriculture, Washington, No. 5492, is supposed to be the same insect mentioned by Packard, p. 665, Fifth Report U. S. Ent. Com., as a "Sumac Leaf Roller," this is an error, as the larvæ mentioned by Packard produces *Episimus argutanus* Clem.

The following additional specimens have been bred, the records will no doubt be of service to future workers.

On *Vernonia noveboracensis* L. (iron weed.) In flower heads, tunnelling and lining galleries with thin silk, larva July 27th, issued August 9th, Caldwell, N. J. No. 3557, Nat. Mus., issued May 22d. Another Nat. Mus. specimen bears a small label "From *Vernonia* June 15, 80," and a large label "A small *Gelichid.* This "is a ♀ of a species of *Gelichia* allied to *Evapora apicidripunctella* "Clem. (signed) Walsingham 1886"—of course, a wrong determination. One specimen, Murtfeldt coll. "No. 3557 Iss. May 12," and another Murtfeldt specimen with this label "Larva ⅜ inch long, "livid dark brown, head fuscous, piliferous spots glassy, hairs rather "long. Very active, feeds in young shoots of *V. nove.* In chang- "ing to pupa forms a small cylindrical case from a bit of leaf, iss. "July 3, 79."

I have taken larvæ in flower heads and seeds of *Vernonia* betweed middle and last of September, which I think are this species, but failed to carry them through the winter. The moth is very close to *slingerlandana*, but a series of perfect bred specimens are necessary to define the differences.

On *Ambrosia trifida* L. (horse cane, great rag-weed). One specimen, Murtfeldt collection, "From larva feeding in seeds of *A. trifida*, Apl. 25, 1884." This is allied to *rhoifructana*, but seems distinct.

On *Magnolia virginiana* L. (swamp or laurel magnolia). One specimen, Dist. Col. Larva August 1st, pupa August 7th, issued August 15th. Larva in mid-rib tent on underside of leaf, pupa in flap cut out of edge or interior of leaf. August 1st, near Moorestown, N. J., in a swampy piece of woods. Nearly every magnolia leaf showed the work of this larva, including the tent and cocoons, each of latter with empty pupal shell projecting from it. Unfortunately no live specimens were to be found.

Also reported as bred from Sassafras, wild-raspberry and thistle. I have not seen any of these specimens, and have no doubt that a number of others will be found in other food plants, as soon as a

determined effort is made to secure them by breeding. It is rather notable that almost no flown specimens are to be found in any of the large collections. I have two taken at Anglesea, N. J., May 25th at light. The moths are quite small and obscure looking, and it is probable they are not easily disturbed in the daytime, hence their apparent rarity, but they can be bred with very little effort, and I believe will eventually be found to be very common and widely distributed.

At the present time (October 15) I have in pupæ most of the above species as well as others that I believe to belong to this genus from a number of food plants.

EXPLANATION OF PLATES.

PLATE XIX.

Fig. 1-2.—*Polychrosis botrana* Schiff.
" 3. " *rhoifructana* Kearf.
" 4. " *slingerlandana* Kearf.
" 5. " *viteana* Clem.
" 6. " *liriodendrana* Kearf.

PLATE XX.

Fig. 7-8.—Venation, *Polychrosis botrana* Schiff.
" 9. " " *viteana* Clem.
" 10. " " *liriodendrana* Kearf.
" 11. " " *slingerlandana* Kearf.
" 12. " " *rhoifructana* Kearf.

1—P. BOTRANA SCHIFF.
(EUROPE)

4—P. SLINGERLANDANA KEARF.

2—P. BOTRANA SCHIFF.
(EUROPE)

5—P. VITEANA CLEM.

3—P. RHOIFRUCTANA KEARF.

6—P. LIRIODENDRANA KEARF.

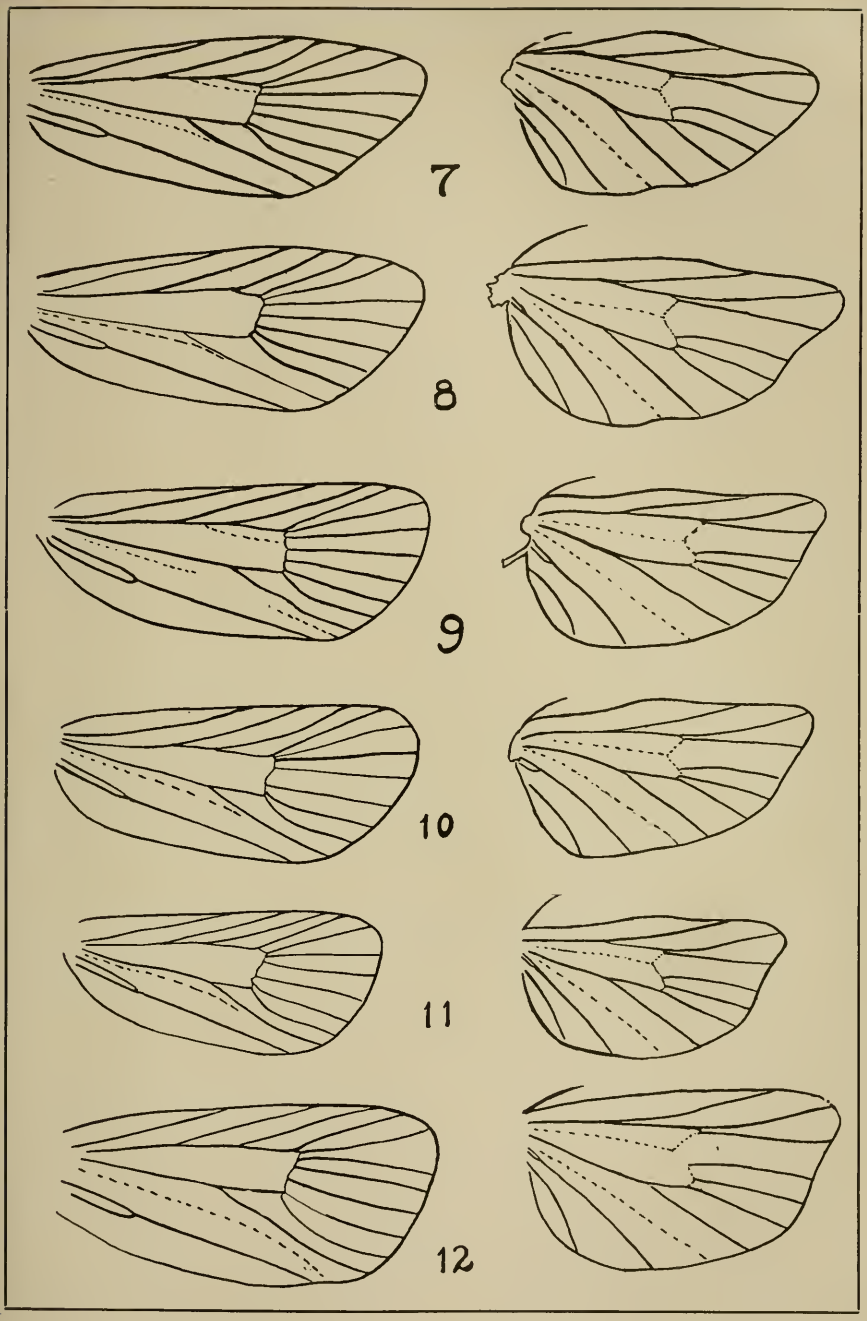

FIG 7.—POLYCHROSIS BOTRANA SCHIFF.
FIG. 8.— " " "
FIG. 9.— " VITEANA CLEMENS.
FIG. 10.—POLYCHROSIS LIRIODENDRANA KEARF.
FIG. 11.— " SLINGERLANDANA KEARF.
FIG. 12.— " RHIOFRUCTANA KEARF.

NEW TORTRICIDS.

BY W. D. KEARFOTT, MONTCLAIR, N. J.

The only apology for publishing the following descriptions at this time, is that the names have been made use of in identifying specimens for Messrs. Saunders, Winn and Young, and that "MSS" species are the *bête noire* of entomology—effectually locking up a species indefinitely, and prohibiting any one from referring to it in any way, no matter how common it may be or how interesting a life-history someone else may have worked out.

Tortrix semipurpurana, var. nov.—Head, palpi, thorax, antennæ and front wings pale lemon-yellow. A large purplish-brown spot rests on the dorsal margin and covers all of the wing, except a narrow line along costa, a small basal patch and a submarginal and apical band of yellow, these are all confluent, forming a wide inverted **U**, transversely through the dark blotch are two shining steel-gray fasciæ, which are continued through the yellow costal margin, as shining *yellow* scales. In the yellow space before the apex is also a short fascia of shining yellow scales, touching the costa. Cilia pale yellow.

Hind wing: Light purplish-fuscous, pale yellow at apex. Under side: front wing, yellowish-white, with upper dark blotch repeated by a shade of pale purple. Under side: hind wing, same as upper side.

Abdomen and legs very pale yellow, with a fuscous spot on upper side of segments 10 and 11.

Five ♂, twelve ♀. Bred, Montclair, N. J., oak, VI., 9; Cincinnati, Ohio, VI., 4 to 15, Miss Annette F. Braun; New Brighton, Pa., VI., 16 to 24, Frank A. Merrick; Chicago, Ill., June, Jos. H. Reading; Quincy, Ill., June, O. C. Poling; Toronto, Ont., June, H. S. Saunders.

The male specimens are of a paler purple than the female; in some examples of both sexes the purple area nearly or quite touches the costa at inner and outer third, thus enclosing a small middle costal yellow spot.

This dark form has been included in my collection with *albicomana*, Clem., and while I have not had sufficient experience in breeding to justify entire separation, the constant difference certainly warrants a varietal name.

Co-types, U. S. Nat. Mus., No. 8211, and my collection.

Eulia pinatubana, sp. nov.—Head, palpi, thorax above and upper side of fore wings, yellowish-red. Thoracic tuft, basal patch, oblique and

apical bands dark rust-red. The space between the basal patch and central oblique band is narrow, scarcely lighter than the basal patch, and indicated by a lighter edging on each side of the space which begins at the basal third of the costa and extends obliquely across the wing to the middle of the hinder margin. The space beyond the central band is similar to the last, beginning near the outer third of the costa and extending obliquely across the wing to the anal angle. The outer margin in some specimens is of the same colour as the interspaces, and the costa is more or less flecked with light yellow. Fringe yellowish, with grayish scales at the anal angle. Hind wing and abdomen above, silky gray or slate colour; under side and fringes lighter. Under side of fore wing light fuscous, lighter yellowish diffused spots along the costa and outer border. Under side of abdomen and thorax light straw yellow, as are also the legs. Fore and middle legs annulated with brown. Expanse 13. to 14. mm.

The above description is copied from p. 793, Fifth Report of the U. S. Entomological Commission, 1890, and applies to the Tortricid, the larvæ of which live on white pine, binding eight to twelve "needles" together and living in the tube thus formed. Specimens of the moth had been indentified by Zeller as the European *politana*, Haw., and our species has rested under this name ever since. I have lately secured a good series of *politana* from Europe, and after a critical comparison have no hesitation in separating, especially as the European species does not live in pine, but very dissimilar plants. A very complete life-history of our American species in given is the report referred to above; I have also bred it from larvæ with identical habits in Essex County, N. J., other specimens, of which I have about forty, Winchenden, Mass., V. 26 to VI. 3, Frank A, Merrick; Watchung Mts., N. J., IV. 29 to V. 8; and Toronto, Ont., V. 21, Henry S. Saunders.

Co-types, U. S. Nat. Mus., No. 8212, and my collection.

Phalonia Winniana, sp. nov.—Palpi, basal and second joint ochreous-brown, long scales of latter white on outer half, and almost hiding third joint, which is very short and pale brown; palpi curved upwards, tip nearly at level of top of head. Head and collar creamy-white. Eyes large, round, black. Antennæ one-third length front wing, shortly ciliated beneath; fuscous, slightly paler between joints.

Thorax fuscous. Front wing: A broad transverse ochreous-white band in outer third, followed by a narrower fuscous subapical band, inner two-thirds fuscous and gray-brown. Basal patch not defined, the brownish-fuscous colour covering inner two-thirds, interrupted on dorsal margin by a geminate creamy-white spot, and the costa marked by paler and darker spots. The outer edge of dark area is nearly vertical, it is sharply indented at middle. The white outer band is narrowest on costa, broadening out a quarter below, and involving anal angle and usual position of ocellic spot, which is obsolete. It is white on costa, becoming ochreous towards outer and dorsal margins. Two small fuscous dots mark costa within this white area and two black dots on median line at end of cell. From costa, beyond white fascia, is an olivaceous band, darkest on edges, curving evenly before apex and terminating in a point just above anal angle on outer margin. This is bounded outwardly by a narrow whitish line, beyond a darker—blackish—line, broadest on costa. The apex and apical cilia fuscous, cilia below apex gradually becoming creamy-ochreous. Hind wings whitish in ♂, dark fuscous in ♀, cilia and under side the same, but a shade darker. Under side front wing: smoky fuscous, mottled with darker and with five creamy-white costal spots on outer half. Abdomen: grayish fuscous, anal tuft ochreous, legs creamy white.

One ♂, expanse 10.5 mm., Essex Co. Park, N. J., V., 20. Two ♀, expanse 12.5. mm., Montclair, N. J., VII., 18 (Light-trap), and Orford, Quebec, VI., 8 (Albert F. Winn). Co-type, U. S. Nat. Mus., No. 8213, and my collection.

I have had two of these specimens in my collection for several years, labelled *dubitana*, Hbn., but the recent accession of several European specimens of the latter showed conclusive differences; *dubitana* is creamy-white over the entire surface of fore wing, except a fuscous-brown middle oblique dorsal patch, a smaller costal spot above it, a narrow apical and outer margin line and a small basal patch. I have yet to see an American insect that compares with *dubitana*, and have no doubt that this name, with the majority of other European names in our list, will be dropped when the whole family is better known.

I take pleasure in dedicating this species to Mr. Albert F. Winn, of Westmount, Quebec.

NOTES ON HYDROMETRA MARTINI, KIRK. (=LINEATA, SAY).

BY J. R. DE LA TORRE BUENO, NEW YORK.

Genus HYDROMETRA, Latreille et auctt. (=Limnobates, Burmeister et auctt.) H. Martini, Kirkaldy, 1900 (=lineata, Say, 1832.)

The peculiar facility of the older entomologists, the fathers of the Science, for discarding each other's generic and specific names has in this instance, as in many others, given rise to a complicated synonymy, of which I give above that covering this extremely interesting little water-strider. It is given more in detail in The Entomologist (London, Eng.) for June, 1900, on page 176, in which Kirkaldy elucidates it, relegating Say's specific name to synonymy, as it unfortunately has been preoccupied by Eschscholtz, who in 1822 described *Hydrometra lineata* from Manila, Philippine Islands. In the paper mentioned hereafter, Mr. J. O. Martin discusses the generic synonymy.

In March, 1900, pp. 70–76, THE CANADIAN ENTOMOLOGIST published "A Study of Hydrometra lineata," by the last named author, a most interesting paper on the habits and peculiarities of this Hemipteron. The notes I now present are largely supplementary and confirmatory of his work, although I may say that my labours were not directed to that end. In May of 1903, Mr. W. T. Davis took me to Staten Island, where, in a marshy pond, we found *Hydrometra Martini* by the hundred. We took them until we got tired. Again in May of this year, we took very many more at the same place. Subsequently, I have found them here and there, in ones and twos, or in greater numbers, without any effort, which bears out Mr. Martin's experience, although I have nowhere found them as abundant as at Staten Island. This little bug prefers to hug the shore, hiding among the grass-stems growing out of the water. One's shadow falling on it seems to disturb them, and they emerge from their hiding places, and these seemingly tiny twigs can be seen moving briskly away, borne on their hair-like legs, with which they *run* on the surface, or else they remain motionless, letting some friendly little breeze waft them away. It is to be noticed that *Hydrometra walks* on the surface of the water and does not propel itself by a rowing motion, as do the *Gerridae* and other Water-striders. Its tarsi also are provided with claws terminal and not set above the tip of the last tarsal joint as in the latter family. The winged form of *Hydrometra Martini* must be very rare in the north, as out of about two or three hundred individuals I have seen, I have found only two fully winged males.

January, 1905.

answering to his description. The genital characters are such, however, that I think it may be considered a new species, for which I propose the name *Hydrometra australis*. The figures attached (Figs. 3 and 4) show the differences in the genitalia, drawn from my specimen (a male), for *australis*, and redrawn from Martin's figures for *Martini*.

In addition to the characters drawn from the *genitalia*, it differs from the typical *Martini* in the antennal and head characters pointed out by Say, which appear to me sufficiently definite for separation. Lack of material has prevented me from making the detailed study necessary to indicate them minutely, but careful examination of my single specimen leaves no doubt as to their presence.

Fig. 3.—Hydrometra Australis. Male genitalia from side and above. (Original.)

Fig. 4.—Hydrometra Martini, Kirk. Male genitalia from side and above. (After Martin.)

A NEW GELECHID FROM ONTARIO.

BY W. D. KEARFOTT, MONTCLAIR, N. J.

Aristotelia Youngella, sp. nov.—Head, antennæ, palpi, thorax, abdomen and legs shining iridescent green. Basal half of front wing and outer half along costa black or very dark brown, heavily overlaid with iridescent green. The dark basal half is outwardly margined by the black ground colour, owing to absence of the iridescent scales at this point. All the outer half of wing, except the dark costal streak, is dull ochreous, inwardly margined by a pale yellow line, the latter adjoining the dark line of ground colour outlining the basal half. The ochreous and yellow touch the costa at the middle only, and the ochreous shade encloses the dark costal patch, the latter divides the apex and is one half the width of the wing except at its inner end where it is rounded

off into the costa. A tiny dark-brown or black dot on ochreous just at end of cell, and below, but not touching the dark patch above it. The division line in middle of wing, dividing dark basal half from ochreous outer half, is slightly oblique. Cilia fuscous. Hind wing and cilia fuscous, latter once and a half to twice the width of hind wing. Under side front wing fuscous, thinly overlaid with iridescent green, hind wing same, but green only along costal half. Expanse, ♂ 10. to 10.5 mm., ♀ 12. to 12.5 mm.

Nine specimens, ♂ and ♀, Hurdman's Bridge, near Ottawa, Ont., VII., 7 and 9. Co-types, U. S. Nat. Mus., No. 8214, collection of Mr. Young, and my collection. Collected by Mr. C. H. Young, whose name I am particularly pleased to associate with this very beautiful and dainty species, as strictly representative of his own exquisite work in the Micro-Lepidoptera.

A NEW SPECIES OF NORTH AMERICAN PROTEOTERAS.

BY PROF. C. H. FERNALD, AMHERST, MASS.

Proteoteras Moffatiana, n. sp.—Expanse of wings, 14–20 mm. Head, thorax and fore wings emerald green, varying considerably in the different specimens, some being much brighter than others. The fore wings are marked with black, and many parts have silvery reflections in certain lights. On the basal fourth of the costa there is a small quadrate black spot, below which the basal part of the wing is more or less marked with streaks or irrorations of black. On the middle of the costa is a black quadrate spot connected below with a black stripe extending from the cell outwardly, but not reaching a subapical black spot, which sends a prolongation down along the outer border. There is a series of geminate light spots on the costa, two at the base, two between the quadrate costal spots, and five on the outer half of the costa. The extreme apex is black.

Hind wings and abdomen above fuscous; under side of all the wings fuscous. The costal edge of the hind wings of the males beneath marked with black.

Described from four males and three females. Habitat, London, Ont. (Moffat); Lancaster, N. Y., Oct. 22, 1880; Milford, N. H., June 28, 1870 (Whitney).

I take pleasure in naming this interesting and variable species after the late J. Alston Moffat, who for many years was the able and industrious curator of the Entomological Society of London, Ontario.

January, 1905.

SMITHSONIAN INSTITUTION.
UNITED STATES NATIONAL MUSEUM.

DESCRIPTIONS OF NEW SPECIES OF TORTRICID MOTHS, FROM NORTH CAROLINA, WITH NOTES.

BY

WILLIAM DUNHAM KEARFOTT,
Of Montclair, New Jersey.

From the Proceedings of the United States National Museum, Vol. XXVIII, pages 349-364.

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DESCRIPTIONS OF NEW SPECIES OF TORTRICID MOTHS, FROM NORTH CAROLINA, WITH NOTES.

By William Dunham Kearfott,
Montclair, New Jersey.

I am indebted to my friend, Dr. Harrison G. Dyar, for the opportunity of working up a most interesting and remarkable collection of Tortricids, made by Mr. W. F. Fiske during the summer of 1904 in Tryon, North Carolina. In a total of only 80 specimens there are nearly 50 species, of which about a dozen are, to the best of my belief, new to science. The specimens were taken at light, flying into the open windows during the evenings.

This list covers the entire collection made by Mr. Fiske, excepting a single specimen each of two species. I think both are new, but as I am unable to find duplicates in my unnamed material I hold them back for next year's catch, as it is undesirable to make species from single examples, if it can possibly be avoided.

EVETRIA GEMISTRIGULANA, new species.

Head, palpi, and thorax light gray, speckled with fuscous and black; the darker shades predominating on outer sides of palpi and patagia. Antennæ light gray, annulated with black, very shortly ciliated in male. Palpi short, scarcely extending beyond face, porrect; outer joint short, black, exposed; tuft on second joint flattened, neither compressed or loosely scaled, longer on upper than lower side. Forewing pale, rather lustrous gray, crossed transversely by many interrupted lines and narrow bands of black. The gray appears to be laid on a black ground rather than the reverse, and the gray lines are usually in pairs. In basal area, which is not very distinctly defined, occupying the inner quarter, three geminate white lines are more or less fused together; beyond, to the outer margin, they are more distinctly in pairs, of which, between inner fourth and apex, are about six on costa, extending a third or half the width of wing; below these other abbreviated pairs continue to the dorsal margin, but, excepting one line just before the outer marginal lines, none continue unbroken from costa to dorsum. There is a tendency in several specimens for

the black to overrun the gray in three rather distinct spots, two on costa, one beyond middle, and one before apex, and on dorsum half way between the two costal spots. A rather large triangular black spot on the extreme apex, and between it and the base the costa is rather evenly marked by alternate gray and black, about twelve to fifteen of each. This number is reduced on the specimens with large black costal blotches. Of the four specimens before me no two are exactly alike in the proportions of light and dark colors, nor is the lineation sufficiently duplicated to describe one in detail as the type. Cilia gray. Hind wing, upper and lower sides dark gray, cilia paler. Under side front wing dark fuscous, with whitish costal and dorsal marks repeated from above. Abdomen and anal tuft gray. Expanse 19 to 21 mm. Four male specimens May 17 to 25; collected by Mr. Fiske, Tryon, North Carolina.

Cotypes.—Cat. No. 8238, U. S. Nat. Mus., and in my collection.

I place this species temporarily in *Exetria*, as it seems nearer to it than any other familiar to me. Veins IV and V of front wings are not connate; they arise separately, but very close together. Veins III and IV of hind wings are stalked for half their length. No costal fold in the male. The frenulum fold on under side of forewings extends to outer three-fifths.

POLYCHROSIS LIRIODENDRANA Kearfott.

One female, August 8. Exactly like type and easily recognized by the reddish-ocherous appearance of the forewings.

OLETHREUTES HEBESANA Walker.

Three specimens, May 9 and August 13.

PSEUDOGALLERIA INIMICELLA Ragonot.

One male, July 7.

EUCOSMA QUINQUEMACULANA Robinson.

One male, no date of capture.

EUCOSMA ROBINSONIANA Grote.

One female, June 4.

EUCOSMA ROBINSONIANA Grote var TRYONANA, new variety.

Head and thorax pure white; a collar of olive brown divides head from thorax, crosses shoulders of patagia and runs into the ground color of forewings on the costa. Palpi white, inwardly and above, fuscous outwardly. Antennæ pubescent, light gray, narrowly darker between joints, enlarged basal joint pure white. Forewing pale olive brown, with two white spots on outer half of costa, each inclosing a

small dot of ground color; two vertical white fascia arising from inner half of dorsal margin, but reaching only to upper vein of cell; a large white spot in anal angle with a small round white spot before and beyond it, these two being sometimes joined to the large spot; a a small white spot on outer margin below apex and a tiny white patch at extreme base, a continuation of the white scales of thorax. These white spots are all narrowly bordered by darker-blackish lines. Cilia dull fuscous. Hindwing fuscous, cilia paler. Underside: forewing dull smoky fuscous, with white spots on costa faintly repeated from above, cilia same; hindwing slightly paler than fore wing. Abdomen fuscous, anal tuft cinereous. Legs white, annulated with olive-brown. Expanse 16.5 to 17.5 mm. Three male specimens. Tryon, North Carolina, collected by Mr. Fiske, May 17 to June 1.

Cotypes.—Cat. No. 8239, U. S. Nat. Mus., and in my collection.

It differs from *robinsoniana* in larger size, paler ground color, and especially in the white spot at anal angle, which is, in this variety, a cluster of three or four smaller spots, more or less joined, while in *robinsoniana* this spot is simple and covers less than one-third of the area. In Bulletin 52, U. S. National Museum, *robinsoniana* is made a synonym of *quinquemaculana* Robinson. But a study of the types at the Academy of Natural Sciences, Philadelphia, and the possession of a long series of both forms convinces me of their distinctness. *Quinquemaculana* differs from either of the above by: Head, thorax, and palpi brown, not white; position of two inner bands not the same; the inner is a basal patch and the second one is double the width and reaches to the costa. The outer costal spots do not inclose a dot of ground color and are of different shape and size, which is also the case with the spot on anal angle, and most notably all the spots of *quinquemaculana* are silvery white, while those of *robinsoniana* and *tryonana* are dull white. I have male and female of both Robinson's and Grote's species, and they show no sexual difference.

EUCOSMA ADAMANTANA Guenée.

Three specimens, September 1. Both Mr. E. Daecke and I have taken this species early in September, near Hammonton, South New Jersey, and I believe these and Mr. Fiske's captures are the first that have been made since Guenée's time; as his description[a] is not readily accessible, it will be of interest to add that the species can be at once recognized by the almost perfect rusty-red cross on each fore wing, on a bright silver background. The longer limb of the cross arises on dorsal margin, close to base, and continues into apex, the cross-bar begins at center of costa and goes to anal angle. There is no other species of *Eucosma*, known to me, at all near this style of ornamentation. Mr. Daecke has most thoroughly worked this South New

[a] Ann. Ent. Soc., Fr. (2), III, 1845, p. 303. (Type, from New Jersey.)

Jersey region, from earliest spring to late in the autumn, and, except in September, has never seen the species, it is therefore reasonable to assume that it is one-brooded, and I venture the assertion that the larvæ of this, as well as the majority of other silver-marked *Eucosma's*, are borers or internal feeders.

EUCOSMA CIRCULANA Hubner.

One male, August 1. Exactly like Hubner's figure. Type was from Pennsylvania.

EUCOSMA PERGANDEANA Fernald.

One male, May 31.

EUCOSMA GRACILIANA, new species.

Head, palpi, thorax, and fore wings pale fawn brown. Outer ends of scales of palpi stained with fuscous.

Forewing.—Inner two-thirds of costa alternate short oblique lines of white and fuscous brown, in outer third same formation is continued, but ground color replaces the fuscous brown, and silvery metallic overlay the white. A vertical white line occupies the extreme apex, and on costa before and close to it are two other lines; the length of these three lines is nearly one-third the width of wing; the central one is most heavily metallic, while that on apex is simply dull white. Before this group of three vertical lines, and counting toward base, with apical spot number one, the fourth, sixth, and eighth are prolonged obliquely, then horizontally outward, the outer ends of the two former coming together, the extensions heavily overlaid with metallic. The ocellic spot is large, its inner side formed of a vertical metallic bar over one-third the width of wing; a similar bar defines the outward edge, but it is broken near lower end and slightly turns inward toward anal angle. Between these two bars are two narrow horizontal black lines, connecting them together at the top; a third line is indicated below by a few black scales. Above the ocellic spot on outer margin is a small metallic spot. All of the interior of the wing, below the costa and before the ocellic spot, is rather evenly dotted with metallic, arranged in rather straight horizontal lines, of which three lines are above and three below the fold. The dots in the subcostal line have a tendency to run together in groups of two or three; all others are separate. A scale or two of fuscous usually accompanies the metallic scales wherever they occur.

Male costal fold closely compressed, about one-fourth length of wing, a shade or two more tawny than general ground color. Cilia pale cinereous, heavily powdered basally with tiny black dots. Hind wing fuscous, cilia white, underside same, but a shade paler. Underside fore wing smoky fuscous, costa marked with dark blackish dots, cilia

pale cinereous. Abdomen fuscous, anal tuft cinereous. Legs pale cinereous, shaded with brown, tarsi annulated with brown. Expanse 16.5 to 19 mm.

Four males, Tryon, North Carolina. Two, May 20–22; two, July 3–24.

Cotypes.—Cat. No. 8240, U. S. Nat. Mus., and in my collection.

I have hesitated some time before describing this species, as there are several already described similar to it, and it seemed as though a place could be found for it. The nearest to it and their differences are as follows:

E. irroratana Walsingham is fawn colored, and is dotted with shining scales, but the interior scales are arranged in wavy lines, the ocellic spot contains a number of black dots—not bars, no reference in the description to the very distinct costal markings; 50 per cent or more larger; habitat California.

E. atomosana Walsingham is milk white, reticulated with fawn and irrorated with fuscous (not shining), only 10 to 20 per cent larger, but hailing from California.

E. cataclystiana Walsingham. This is a common Eastern species of about the same shade of brown, but the interior lustrous dots are entirely absent.

E. monogrammana Zeller is much paler, less dots, different ocellic and costal arrangement, and more nearly resembles *atomosana*.

E. albiguttana Zeller is very close, the marking is almost identical, but is only about half the size, the interior dots are arranged in four or five vertical rows and are far less numerous proportionately; the hind wings are paler, and the metallic lines around the ocellic spot somewhat different. Additional study may prove *graciliana* nothing more than a gigantic race of *albiguttana*, hence it should be placed next to it in the list.

EUCOSMA PALLIDIPALPANA, new species.

Head with long loose scales in front and on top, pale ochreish at base, pure white at tips; second joint of palpi clothed with long loose white scales, concealing third segment, shaded basally and outwardly with pale ochreish. Thorax dull ochreish. Fore wing pale fawn or dull ochreish. The ground color only in patches along dorsal margin, streaks along outer half of costa and before outer margin. The costa from base to apex is white, evenly marked with about sixteen short oblique grayish-brown dashes, arranged in eight geminated spots; a little beyond base a white transverse line is overlaid on its middle by brownish-fuscous. From about the inner third of costa another such line goes obliquely to the anal angle; at about the middle of the wing a right-angled spur from this to dorsal margin; half-way between this first spur and anal angle a second points toward costa, but

only reaches half-way through cell, where it runs into a large patch of brownish scales on the upper half of outer quarter. A narrow line of brown scales runs through upper half of cell from oblique line to outward patch. From the third from costa geminated spot a lustrous white line runs below the costa and before apex turns down to ocellic patch; from second spot before apex a shorter line of the same scales runs into the first line. Ocellic patch large, lustrous white inwardly, with two or three black dots on each side, a smaller white spot just below middle of outer margin and a smaller white dot below this, the latter only separated from the large white patch by a black line; above the latter and between the large patch and outer margin is a small round spot of ground color, nearly surrounded by narrow black lines; above it are three horizontal black dashes. There is a broken line of black scales dividing the upper white spot, thence running into anal angle through outer margin. The dorsal margin is narrowly, for its entire length, marked with white and fuscous scales, increasing to a triangular patch in the middle (where first spur runs into dorsum). The apical spot is flat triangular inclosed in white. Cilia and outer margin light gray, closely speckled with light brown. Hind wings fuscous, cilia paler, same beneath. Underside forewing fuscous, with white costal dots repeated. Abdomen fuscous, legs whitish, tarsi annulated with light brown. Expanse 11.5 to 13.5 mm.

Nine specimens: Tryon, North Carolina (Fiske); Washington, District of Columbia, June and July (Busck); Fortress Monroe, Virginia, July 19 (Kearfott).

Cotypes.— Cat. No. 8241, U. S. Nat. Mus., and in my collection.

I should place this species in the *cataclystiana* group, and close to *imbridana* Fernald, which it somewhat resembles, but is much smaller.

EUCOSMA GIGANTEANA Riley.

Four specimens, August 5 to 27.

EUCOSMA JUNCTICILIANA Walker.

One male, August 13. Agrees with the Eastern form of this species, in which the oblique median line has a small outward hump about its middle, while all of the Northwestern and Californian specimens I have seen has this line perfectly even on its outer edge.

EUCOSMA ABRUPTANA Walsingham.

Three specimens: June 2, July 5, and August 18. These dates show a rather long period of emergence. The insect is probably single brooded and the larvæ borers or internal feeders like allied species.

EUCOSMA SCUDDERIANA Clemens.

One male, April 24 at light. Larvæ make round galls on stems of golden-rod.

EUCOSMA OTIOSANA Clemens.

One male, June 30. In the winter time, in all parts of northern New Jersey, the larvæ of this species can be found in the dried, previous summer's stalks of *Bidens frondosa* Linnæus or beggar ticks, pupating within the stalk in May and issuing during June.

EUCOSMA DORSISIGNATANA Clemens var. CONFLUANA, new variety.

Dorsisignatana is deep chocolate brown, overlaid with grayish scales, except on two bold distinct separate spots—one on dorsum before middle and one on costa beyond middle. In variety *confluana* the two spots are joined together; the dorsal end is narrower, the whole representing rather an inflated comma. The ground color is also more of a reddish brown, and the hind wings are much paler. I have about forty specimens of the two forms in my collection, and the difference is constant; the spots are either entirely separate or joined. Clemens had this form before him when describing *dorsisignatana*, and described it under the name of *similana*, adding that it might be the female of the preceding. *Similana* is preoccupied in this genus, hence Clemens's name can not represent the variety; it is quite possible, however, after more is known about the Tortricids, that Hübner's species and Clemens's species may fall into different genera, when *confluana* will be superseded by *similana* Clemens. Expanse 18 to 21 mm. Twelve specimens, male and female. Essex County, New Jersey, August 24 to September 5 (Kearfott); Winchenden, Massachusetts, August 24 to September 1 (Merrick); New Brighton, Pennsylvania, August 28 to September 1 (Merrick).

Cotypes.—Cat. No. 8248, U. S. Nat. Mus., and in my collection.

EUCOSMA DORSISIGNATANA var. DIFFUSANA, new variety.

In separating the above another variety seems to be constant; it is of the dark chocolate form, but so heavily overlaid with gray scales that only the lower half of the dorsal spot is distinctly defined, all the balance of the forewing being an almost fuscous brown. Expanse 15 to 22 mm. Eleven specimens: Tryon, North Carolina, August 8 (Fiske); New Brighton, Pennsylvania, August 30 (Merrick); Vernon Parish, Louisiana, August (G. Coverdale); Newark, New Jersey, September 19 (Weidt); Charleroi, Pennsylvania, September 1 (Merrick); Essex County, New Jersey, September 16 (Kearfott).

Cotypes.—Cat. No. 8249, U. S. Nat. Mus., and in my collection.

EUCOSMA MINUTANA, new species.

Face and palpi cinereous, tuft on second joint outwardly rounded, third joint concealed; top of head, thorax, and forewing dark gray, minutely and closely dotted with cinereous. An oblique paler shade, from inner third of dorsal margin, defines the basal area; the line of demarcation is sinuate, with three outward and two inward indentations to middle of wing, where it disappears. Ocellic spot small, rounded, cream white, with a black horizontal dash about its middle which cuts through its outer side; another black dash on the upper edge, immediately above the lower. These two black dashes are so arranged that, under a glass, the white ocellic spot has the appearance of a compressed interrogation mark, or comma laid on its side, with the straight end pointing to the outer margin. Several other black dots partly surround the white spot—one, a dash, before it, and above the dash a smaller dot; another vertical dash defines the outer end of the comma. The costa—from inner third to apex—is marked with gradually increasing in size triangular oblique dark-brown dashes, each edged with cream white, irregularly arranged as four sets of geminate spots. The apical spot is cream white, divided by brown line; the costal spot before the apical sends a long, dark-bluish line obliquely to outer margin, then turns downward to top of ocellic spot, where it unites with a similar line out of apex. Cilia same as ground color, and with the space beyond the ocellic and subapical marginal lines forming quite a wide marginal band. Hind wing and cilia smoky brown, a shade paler beneath. Underside forewing dark brown, with whitish marks repeated on costa. Abdomen and legs gray, speckled with light brown, tarsi annulated with cinereous. Expanse, 9 to 14 mm. About forty specimens. Tryon, North Carolina, May 24–25, Fiske; Cincinnati, Ohio, May 21 to August 17, Miss Braun; New Brighton, Pennsylvania, May 20, Merrick; Plummers Island, Maryland, July, Busck; Belvidere, Illinois, August, Snyder; Smith County, Tennessee, June, Kemp; Anglesea, New Jersey, June 22, and Essex County Park, New Jersey, May 18, Kearfott.

Cotypes.—Cat. No. 8242, U. S. Nat. Mus., and in Miss Braun's, Mr. Merrick's, and my own collection.

I have long had these specimens mixed with *E. strenuana* Walker, which it is superficially much like, excepting very much smaller size. But, in addition to the size, it can be separated by grayer ground color, difference in ocellic spot, and arrangement of costal spots. Structurally, the forewings are more than three times as long as wide, much narrower than *strenuana*. The outer margin of forewing of both species is sinuate, thus differing from *E. circulana*, which is the type of the genus; and therefore when this cumbersome genus is divided, both of these species will fall into a different genus.

EUCOSMA SOMBREANA, new species.

Head very pale brown or bleached straw color, palpi brown, speckled with minute paler atoms, tip of third joint not exposed, thorax same as palpi. Forewing reddish brown, heavily dusted on inner half with cinereous. From middle of costa the cinereous scales form a straight line pointing to anal angle, but interrupted before middle, then continued to anal angle as golden metallic scales; at angle the metallic line is continued up along the outer margin to its middle, thence inward, and almost meets a spur of the middle line, altogether inclosing a vertical ovate section of the red-brown ground color. On costa beyond middle line are six more or less obscure oblique short lines of cinereous, the lower end of each becoming metallic. Entire length of costa cinereous speckled with brown and a preciliate line of the same. There is a very obscure broad paler transverse fascia beyond middle of wing, defined more clearly on the lower half, where it contrasts with a darker shade before it; other specimens are better described by saying that a darker shade rising from inner fourth of dorsum obliquely toward costa, but on cell coalescing with outer ground color. This dark shade is caused by the absence of the cinereous dots. Male costal fold very wide and three-fifths the length of wing. Cilia fuscous, speckled with whitish. Hind wing dark smoky brown, cilia paler, preceded and divided by paler lines. Under side forewing clay-brown basal and central part of wing, dull ocherous around edges. Hind wing dull ocherous. In other specimens the ground color of upper side of forewing is darker red-brown, almost purple brown, and the cinereous dusting less in evidence; the under sides of these darker specimens is almost a uniform dark brown, with slightly paler cilia. The females seem to be less cinereous and to have more metallic lines on outer half of costa and below apex, but as all before me are rather badly rubbed, this may not be true in fresh specimens.

Abdomen, fuscous mixed with cinereous scales. Legs dull ocherous, tarsi annulated with brown. Eight males, expanse 20 to 25 mm., four females expanse 20 to 23 mm. Tryon, North Carolina, July 14, Fiske; Chicago, Kwiat; Cincinnati, Ohio, August 2, Miss Braun; Scranton, Pennsylvania, July 26, Lister; Plummers Island and Cabin John Bridge, Maryland, August 1–10, Busck; Montclair, New Jersey, Electric Light, August 4, Kearfott.

Cotypes.—Cat. No. 8243, U. S. Nat. Mus., and in collections of Miss Braun, Mr. Lister, and my collection.

I think the larvæ of this species will be found to be a borer in the stems of possibly an annual plant, there seems to be a small race with both males and females about 20 mm., and a large race with both sexes from 23 to 25 mm. This can be accounted for by the supposition that some larvæ have lived in small and others in large stems. I would

place this species close to *E. dorsisignatana* Clemens, which it rather resembles in size, shape, and general robust appearance, superficially much like a moderate sized noctuid.

EUCOSMA RUSTICANA, new species.

Head, palpi, and thorax, shades of brown; face, inner and upper sides of palpi, light fawn brown; lower and outer edges of palpi and ends of scales on top of head, dark smoky brown; thorax and patagia light fawn, overlaid, especially anteriorly, with darker brown. Forewing the same shades of brown as above, the costal half dark smoky or blackish brown, the dorsal half and outer margin light fawn brown. The shades are not sharply divided and differ more or less in different specimens. The costa is darkest, and is marked by nine or ten black dots; between those on outer half are geminated streaks of a lighter shade. Below the costa the dark shades are in irregular horizontal lines from base to beyond end of cell, the dark color is rather concentrated at end of cell, and at the upper end is a small ovate pale line inclosing a black dot. The ocellic space is large, pale fawn, with one horizontal dark streak on its upper side in the male and two streaks in the female. Before this spot, running obliquely inward toward dorsal margin, is a line of dark scales. The dark shades almost entirely overlay the light shades on the dorsal half of the female from base to ocellic spot. Apex marked with a small rectangular pale fawn dot, with black dots before and below it. Cilia pale fawn, with three or four darker dots on upper half. Hindwing very dark smoky brown; cilia pale fawn, with a slightly darker line at its base. Under sides of both wings much like the upper sides, but the shades are more diffuse. Abdomen dark brown, anal tuft light brown. Legs pale brown, first and second pairs and tarsi of third, annulated with dark blackish brown. The male costal fold is rather narrow and not quite half the length of the wing.

Six specimens: Tryon, North Carolina, Fiske, May 13 and 22, August 1; Kerrville, Texas, Doctor Barnes; Algonquin, Illinois, June 4, Doctor Nason.

Cotypes.—Cat. No. 8244, U. S. Nat. Mus., and in my collection.

EUCOSMA FISKEANA, new species.

Head, thorax, and palpi cinereous brown, palpi with black tip of third segment visible, although scales of second joint project beyond it below, scales of palpi shaded with dark brown at tips and an oblique streak of same close to base on outer side.

Forewing ashy gray with dark brown fascia and spots. Basal area dark brown, overlaid with gray above dorsum, and strigulated with darker transverse lines, covers inner fourth of costa, angles outward to middle of wing, thence obliquely inward to dorsum, between latter and middle slightly indented. Beyond is an irregular oblique fascia

of ground color sharply defined only on upper half, strigulated with darker transverse lines. This shade really covers all of the wing beyond basal area, but interrupted as follows: In the middle of costa a triangular dark brown patch, its lower point reaching to median line; it is interrupted on costa by a pair of ground color lines, the inner curling inward and blocking off a rectangular costal spot of the dark color. Before the anal angle a triangular brown spot extends to middle of wing; it is separated from the costal patch by a broad band of ground color; it is darkest at its upper end and outwardly and upwardly defined by a paler luteous line. Arising from the anal angle and following outline of outer margin to middle, thence curving evenly inward beneath the costal spots, is a broad line, swelling out into a flattened ovate spot above, pale brown on its lower half, gradually becoming darker to the lunate spot, which is jet black. The ocellic spot between this and the dorsal triangular spot is luteous gray, with the flattened black dots in a vertical line; the upper one is the most constant and largest. The apical spot is moderate on costa, but extends down to nearly middle of wing on outer margin; between this spot and the rectangular brown spot on middle of costa are three large brown costal spots, separated from each other by geminated luteous lines, the line between third and fourth spots from apex (counting apical spot as number one) borders the outer spots below and runs into the outer margin, thence upward to apex, outlining the apical spot. Cilia gray.

Hindwing smoky-brown, cilia gray, divided by a slightly darker line. Under side forewing, dark smoky brown with paler geminations along costa and a paler shade before cilia which is cinereous. Under side hind wing grayish brown, reticulated transversely over its entire surface with darker brown lines. Cilia grayish brown with an outer and middle line of fuscous. Abdomen grayish brown, anal tuft dark brown. Legs same annulated and shaded with dark smoky brown. Expanse, male 23 to 24.5 mm.; female 29 mm. Two males, one female, Tryon, North Carolina, August 2–11. Collected by Mr. W. F. Fiske, whose name I take pleasure in giving to this species.

Cotypes.—Cat. No. 8245, U. S. Nat. Mus., and in my collection.

EUCOSMA CONSTRICTANA Zeller.

Two specimens, August 8. Differing from Texan specimens in my collection, the shades of which are reddish brown, in being shades of steel gray and black. Further material may prove these specimens to be a good variety or different species.

THIODIA RADIATANA Walsingham.

One male, May 1. Quite badly rubbed, but probably this species, or one of the closely allied, of which I have five awaiting opportunity for description.

ANCYLIS ALBACOSTANA, new species.

Head, on top, cinereous, mixed with ferruginous scales, a collar of whitish next to thorax, in front brown. Palpi cream white; ends of scales of second joint, which conceal the third joint, dark brown; a few scales of this color on outer sides of palpi. Antennæ cinereous. Thorax next to head a transverse band of lead color, another band of this color crosses the middle, each followed by a band of whitish. Patagia and thoracic tuft lead color at base, tips white. Fore wing lead color, rather heavily overlaid on inner two-thirds below the costa with brownish and blackish scales. From the base to the apex on the costa is a pure white band, widest at end of cell, where it is nearly a a quarter the width of wing; continuing to base with only a trifle less width, and lower edge curving evenly into costa and ending in a point at apex. Below the white streak, on the inner half, are a number of small black dots; three below the fold are well defined, close together in a line in the second quarter; the inner one is single, the middle has a slight projection on the fold, and the outer one is double, its upper half being above the fold. Another black dot is on the upper gray edge, and is conspicuous against the white background above its upper half, before the inner fourth, and is connected by a darker streak with the inner of the three dots below the fold. Many other darker transverse streaks or strigulations cross the lead-color area. The ocellic area and outer margin below apex are dusted with white, a small, round, lead-color spot at anal angle and above it a vertical flattened ovate spot of same color; each are encircled by a line of whitish scales. The apex and the streak between this paler area and the white costal band is dark brown; in the apex is a small ocellus, a circle of black inclosing a dot of lead color and surrounded by dull ocherous. Cilia at apex cinereous, tinged with ferruginous, below apex pure white. Hind wings brownish fuscous above, pale fuscous below. Underside fore wing fuscous, whitish streak repeated along costa, cilia white below apex. Abdomen and legs fuscous, tarsi annulated with dark brown. Expanse 19 mm. Two female specimens: One Tryon, North Carolina, May 11, Fiske; one Colorado, National Museum, Accession Catalogue No. 45.

Cotypes.—Cat. No. 8246, U. S. Nat. Mus., and in my collection.

In describing this species from two females I run the risk of a generic error, but the falcate apex and venation agree with our definition of *Ancylis*.

ANCYLIS SEMIOVANA Zeller.

One male, May 20.

ANCYLIS DUBIANA Clemens.

One male, May 25.

ANCYLIS GOODELLIANA Fernald.

One male, May 7.

ANCYLIS DIMINUATANA, new species.

Head and thorax white, speckled with fuscous. Palpi white, tips of scales above and two spots on outside fuscous. Antennæ golden brown. Fore wing creamy white; a seal-brown shade from base, over middle of wing to end of cell, thence to apex. The lower edge of this brown shade is sharply defined below, but diffuse and running into ground color above. Its lower edge begins at base close to dorsal margin and tends slightly upward to beyond middle of wing, thence acutely upward in a nearly straight line into apex. The lower edge is roundly indented twice on its inner half, where it turns up to apex and opposite the outer margin. It is outlined outwardly by a luteous-grayish line. This, opposite the ocellic spot, is succeeded by a light-brown line, and beyond and defining the ocellic spot is a short luteous-gray line. The ocellic spot is but a shade of brown. All the space along the dorsal margin and before the outer margin below the middle brown streak is ground color, overlain with gray and ferruginous scales. The dorsal margin is dotted with black. Above the brown shade on the inner half of costa is a streak of ground color, on which are three black dots in a line on upper vein of cell. At middle of costa a faint brown line runs obliquely into the brown shade; just below the apex, six other pale-brown lines on costa, between it and apex, start obliquely, but are all separated from the first by a paler line just below costa. These spots are separated by short gray or leaden lines, one just before apex being the best defined, and it is shaded on both sides by whitish brown. Cilia white immediately below apex, with a fuscous dot, below light fuscous with ferruginous tinge, preceded by a dark-brown line, and divided by a slightly darker fuscous line. Hind wing smoky fuscous; cilia paler. Underside fore wing smoky fuscous, whitish along costa, with a black apical dot and dash of white in the cilia below it. Hind wing pale gray; cilia same. Abdomen fuscous, anal tuft dull ocherous. Legs creamy white, washed with light brown on tarsi. Expanse 13.5 to 15 mm.

Twelve specimens: Tryon, North Carolina, May 12, Fiske; Winchenden, Massachusetts, May 26 to June 2, F. A. Merrick; Plummers Island, Maryland, and Washington, District of Columbia, May 19 to June 1, A. Busck; Ramapo, New York, May 27, Kearfott; Caldwell, New Jersey, May 17–22, Kearfott; Wellington, British Columbia, June and July 4, Doctor Taylor and Bryant; Denver, Colorado, April 23, Oslar.

Cotypes.—Cat. No. 8247, U. S. Nat. Mus., and in my collection.

In the National Museum there is a specimen of this species labeled "diminuatana Wlsm.," but I have not been able to find the name or a

description in any of Walsingham's writings. Should it, however, be on record, this additional description will not affect his title to priority.

This species is close to *goodelliana* Fernald, which latter is very close to European *biarcuana* Stephens, which is probably wrongly accredited to America. *Goodelliana* differs from *diminuatana* in its larger size (28 mm.), the brown streak narrower and almost obliquely to apex, and an additional brown line from base nearly to middle below the middle streak. My comparison is made from a specimen of *goodelliana* identified by Professor Fernald. I can not detect sufficient difference between Eastern and British Columbian specimens to warrant separation. The ground color of the latter is more of a silvery white, and the browns a shade darker; otherwise the maculation is the same.

ENARMONIA AMERICANA Walsingham.

Four specimens, May 25 and July 4–5. Agrees very closely with Walsingham's figures and description, except that the hind wings of the male are dark brown, the same shade as female. In Edward's collection, American Museum of Natural History, New York, are specimens from California, labeled *americana*, by Fernald, which are not the same as Walsingham's figure or these eastern species. I am under the impression that *americana* is found both East and West, while there is a closely allied but distinct additional species in California, which has been mistaken for it.

ECDYTOLOPHA INSITICIANA Zeller.

One male, May 26. Larvæ in September in galls on the twigs of common locust.

GYMNANDROSOMA PUNCTIDISCANUM Dyar.

One male, July 3; one female, May 14. The condition of the former is that it may have been on the wing for a month or more, which may account for the considerable difference in dates.

CARPOCAPSA TOREUTA Grote.

One male, June 1. This is a particularly interesting capture, as, so far as I know, the species has never been taken since Grote described it. It is not represented in any of the public or private collections that I have seen.

EPAGOGE SULPHEREANA Clemens.

One male, June 4. Of the medium size northern form, with pale hind wings.

SPARGANOTHIS IRROREA Robinson.

One male, July 14.

ARCHIPS ROSACEANA Harris.

One male, August 8; one female, no date.

ARCHIPS PURPURANA Clemens.

One female, August 8.

PLATYNOTA FLAVEDANA Clemens.

One specimen, August 14.

PANDEMIS LIMITATA Robinson.

One male, June 3.

TORTRIX PERITANA Clemens.

One female, August 12.

TORTRIX FUMIFERANA Clemens.

One female, May 7.

TORTRIX CONFLICTANA Walker.

One male, May 2.

EULIA VELUTINANA Walker.

One male, August 14.

PHALONIA FERNALDANA Walsingham.

Two specimens, May 5–29.

PHALONIA BUNTEANA Robinson.

Two specimens, July 16.

PHALONIA NANA ? Haworth.

One specimen, August 14.

PHALONIA DUBITANA ? Hubner.

One specimen, August 12. I add an interrogation mark to this and the preceding species, as I am not by any means convinced that these European species occur in America.

PHALONIA ANGUSTANA Clemens.

One male, May 20. There is certainly no reason why Clemens's name should not have been restored long ago. Robinson made it a synonym of his *dorsimaculana*, supposing that *angustana* was preoccupied in this genus in Europe. The European species is not a *Phalonia*, but belongs to an allied genus *Euxanthis* Hubner. Besides other differences, Meyrick[a] separates these genera by veins III and IV of hind

[a] Hand Book of British Lepidoptera, p. 557.

wings stalked in *Euxanthis* and separate in *Phalonia*, and gives figure of venation of this particular species, showing the stalked median vein. I also have eight European specimens in my collection, in all of which this vein is either short-stalked or connate. In the American *angustana*, as in all true *Phalonia*, veins III and IV are widely separated at base.

I think there is another mix up between *angustana* Clemens and *dorsimaculana* Robinson and *promptana* Robinson. The two latter were described at the same time, with very little difference either in descriptions or figures. I have not seen Robinson's types, but have carefully examined Clemens's type in Philadelphia, and from my present knowledge I would make *promptana* the synonym of *angustana* and leave *dorsimaculana* as a good but very closely allied species. I have long series, both male and female, of what I believe to be both species, and the most constant marks for separating them are the black dots on outer margin. *Angustana* has a single small dot just above the middle and a tiny one below the apex, while *dorsimaculana* has a marginal row of four horizontal black dashes. If further study should prove this analysis wrong, then both of Robinson's species may become synonyms of *angustana* and the species with the row of marginal dashes will have no name.

PHALONIA DORSIMACULANA Robinson.

Two specimens, July 10. See note above.

ASSINIBOIA MICRO-LEPIDOPTERA, COLLECTED BY MR T. N. WILLING.

BY W. D. KEARFOTT, MONTCLAIR, N. J.

I am very much indebted to Mr. T. N. Willing, of Regina, Assa., for the privilege of working up a very interesting collection of Micro-Lepidoptera. It is particularly notable in recording a number of species that have hitherto been only known by the types, and especially so in establishing a wide range of territory to species that have been only recorded from California. Following this paper I have one in preparation on the same subject, from material collected in Manitoba by Messrs. Heath, Criddle and Dennis, to be followed in its turn by one on Micro-Lepidoptera from Western British Columbia, collected by Dr. Taylor and Mr. Bryant; later I hope to be in possession of sufficient material from the territory east and north of Toronto, which has been less worked than any part of North America, for a fourth paper. It is most gratifying to observe the very great interest in these small insects that has arisen throughout Canada.

TORTRICIDÆ.

Olethreutes consanguinana, Wlsm.—One specimen; Macleod, VII. 2. The most eastern record for this species, common in British Columbia and California.

Olethreutes deceptana, sp. nov.—Palpi, head and thorax pale gray, thickly sprinkled with darker gray atoms, antennæ pale gray. Front wing pale gray, marked with obscure darker gray. The darker shade forming a basal patch, a more or less obsolete middle fascia and streaks before outer margin. The basal patch covers on costal and dorsal margins a fifth of length of wing, but extends outward on middle one-quarter, the outer edge is slightly indented half way between middle and costa, below middle the edge is irregular and almost lost on its lower fourth. The basal patch is thickly covered with darker, nearly black strigulæ and dots, the former parallel to the outer margin of patch. Central dark fascia from middle of costa and narrowest just below costa; its inner edge slightly indented below costa, broadly indented on cell and slightly above dorsal margin; its outer edge is slightly indented below costa, deeply and narrowly at end of cell, thence obliquely towards anal angle, but before

reaching it abruptly turning downward into dorsal margin. Like the basal patch, it is transversely strigulated with nearly black lines and dots. A narrow dark half fascia arises just below middle of outer margin, proceeds obliquely inward towards costa at outer fourth, but terminates before reaching it; it is widest and rounded on its upper end. Between this short fascia and middle fascia, the narrow streak of lighter ground colour is divided by a darker line. The pale ground colour between basal patch and middle fascia, at apex and along outer half of costa is also strigulated with darker gray shades and dots. The costa is marked as follows: In basal patch with two dark dashes; in ground colour before middle fascia with four dark dashes; in middle fascia, the margins of which are nearly black, make two and between them a third dark dash; beyond middle fascia to apex are four paler ground colour oblique lines, each two divided by a darker dash and each with a darker dash in its middle. The inner pale-ground-colour line continues down to anal angle, the second and third merge together below and outline the upper end of marginal semi-fascia, and then continue around its outer edge to middle of outer margin; the fourth and outer pale line runs obliquely into outer margin below apex and outlines the darker apical spot. Cilia with seven whitish and seven dark gray spots, evenly spaced. Hind wing smoky fuscous, paler along costa and basally. Cilia paler. Under side: Front wing smoky fuscous, with whitish spots repeated from above along costa and outer margin; hind wing grayish fuscous, a shade darker at apex. Abdomen gray above; below and legs cinereous.

One ♂, Regina, VII., 20. Three ♂, Aweme, Man., VII., 24, to VIII., 8 (Norman Criddle). One ♂, Chicago, Ill., June (Jos. H. Reading). Co-types, U. S. Nat. Mus. No. 8205, Mr. Willing's and my collections.

I think this is the species that has been masquerading in our lists as *hartmanniana*, Linn., and propose to drop the latter name from our American list. I have a long series of *hartmanniana* from Europe, and a very careful comparison leaves no doubt of their separate identity. In *hartmanniana* the central fascia is differently indented, there is a tendency to its being entirely divided on cell by ground colour, leaving a conspicuous dash half fascia from costa and a dark shade on dorsal margin; there

is also a dark dorsal shade in *hartmanniana* from base to angle, which is entirely wanting in our American species.

Deceptana is not unlike *Archips afflictana*, Walk., but can readily be separated by structural characters. The ♂ of *afflictana* has a costal fold, which is absent in *deceptana*. The median vein of hind wing of *deceptana* is hairy at base above, which is not the case with *afflictana*. The costa of *deceptana* is more rounded or arched than *afflictana*. Zeller's identification of *hartmanniana* was from specimens collected in Mass. by Burgess. I am much inclined to the opinion that these specimens were *afflictana*, which is common in the Eastern States, or it is possible that they were more or less rubbed specimens of *albeolana*, Zell. By removing *hartmanniana* from our lists, Zeller's species *albeolana*, which has been listed as a variety of *hartmanniana*, will become a good species, and represent the very distinctly marked species, the larvæ of which are always found on birch *(Betula alba)*. *Hartmanniana*, according to Meyrick, feeds on Willow (Salix).

Olethreutes vetulana, *Wlsm.—One ♂, Regina, VIII., 30. Described from California and Texas and not since recorded. Type, 17 mm. Regina specimen 22 mm., and more of a dark chocolate-brown than California specimens and type, which are a reddish-brown.

Olethreutes campestrana, Zell.—Three specimens, Regina, VIII., 13, and Pincher, VII., 10; marked identically with Zeller's figure, but expanding only 12 mm. All other specimens in my collection and the types expand 16 to 18 mm. These may be diminutive examples of *campestrana* or a new species, but I would long hesitate describing as new anything in this genus with the characteristic white inner and outer bands and dark fuscous or dark-brown basal patch, central band and sometimes apical patch, forming four or five well-defined vertical fasciæ, as there are already seven species (5469 to 5475, Smith's List) so closely allied that I have yet been unable to separate them. Besides the above is a fourth specimen labelled Indian Head, VI., 29, that is darker and differing in the indentations of the white fasciæ, and especially in the ornamentation of the apical patch, which seems closer to *dealbana*, Walk., but is too badly rubbed to be positively identified.

*Smith's List, 1903, No. 5454, erroneously printed *vestulana*.

Eucosma Morrisoni, Wlsm.—Two specimens, Macleod, VII , 8, and Lethbridge, VII., 11. A trifle smaller and paler than Colorado and Montana specimens.

Eucosma circulana, Hbn.—One specimen, Regina, VI., 18. Same size, but differs somewhat from Eastern specimens, and additional material may prove it to be a new species, or at least a good variety.

Eucosma argentialbana, Wlsm.—Two specimens, Regina, VI , 18. I have no authentic specimens from Texas, where the types were taken, to make a comparison, but feel reasonably sure of this identification, although the Regina examples are more distinctly marked and capable of a much more clearly defined description than that of the type.

Eucosma culminana, Wlsm.—Two specimens, Regina, VIII., 13 and 15. This is a very interesting capture, described by Walsingham, 1879, from California. It has not since been recorded or, as far as I know, taken.

Eucosma illotana, Wslm.—One specimen, Regina, VI., 18. This is also an interesting record, as I am not aware of any printed record of its capture since Walsingham took it in Oregon more than twenty-five years ago. It is not, however, the most Eastern specimen, as I have one from Chicago, taken by Mr. J. H. Reading.

Eucosma Smithiana, Wlsm.—Two specimens, Macleod, VI., 25, and VII., 8. I am rather doubtful of this determination, the specimens are somewhat rubbed, but as far as can be seen agree with the description. If not *Smithiana*, I do not know of anywhere else to place them, and additional material may prove it to be new.

Thiodia dorsiatomana, sp. nov.—Palpi inwardly and basally white, outwardly and second joint above tinged with fuscous ; head and patagia pale brown or fawn ; thorax grayish-brown.

Front wing : Shades of pale olivaceous-brown or fawn, with a white divided median stripe, ocellic spot, sub-apical costa markings, and inner two-fifths of costa narrowly edged with white.

The brown shades are palest along the dorsum, below cell ; between median streak and costa ; above ocellic spot and in a narrow sub-marginal area. The white median streak extends from base to end of cell and is evenly divided its whole length by a narrow black line, a heavier black

line outlines the white streak below, and a less well defined one above. The inner half of costa is minutely dotted with brown. The dorsal margin from inner fourth to anal angle is distinctly marked with seven or eight equally spaced black dots. Ocellic spot, a broad horizontal white bar, with a luteous-white spot above and below it at each end; above and below the bar is a narrow, short black line, and beyond the two outer spots, two or three black dots. The outer two-fifths of costal margin covering a quarter of the width of wing is a beautiful scroll-work of geminate white lines, edged internally with black and enclosing three small spots of ground colour; the outer spot double the width of the middle one and the inner one but little more than an oblique streak. The inner pair of lines from costa just beyond middle, obliquely to and almost touching ocellic spot, the second pair are shorter and curve around parallel to costal, enclosing middle ground colour spot and joining third pair; the latter entirely enclose the large outer ground colour spot, and the lower line of this pair separates from its companion and dips down beyond and defining the ocellic spot, thence curves upward into apex, forming a white apical dash. Cilia long, whitish, finely speckled with gray inwardly, followed two narrow fuscous lines.

Hind wing: Dark smoky-brown, cilia gray, with a darker basal line. Abdomen above and tuft gray, below and legs whitish, tarsi shaded with brown.

Three ♂, expanse 17 to 19.5 mm. One ♀, 18 mm. Regina, VI., 15 to 18, Macleod, VII., 2. Co-types, U. S. Nat. Mus., No. 8210, Mr. Willing's and my collections.

Allied to *striatana*, Clem., *spiculana*, Zell., *argenticostana*, Wlsm., and *clavana*, Fern. Without any other characters a very easy means of distinguishing these species may be found in the scroll-work on costa before apex, which I purpose using later in synoptic tables; the species, all of which have the white or pale median streak, can readily be separated as follows: The white sub-apical streaks of *striatana* are broad, oblique and nearly straight, the inner and apical are geminated, the middle pair entirely separate. In *spiculana* the white costal streak runs into the inner pair, and there is only one broad white apical dash. The costal streak in *argenticostana* continues clear to the apex as a narrow line, the streaks are almost obsolete. *Clavana*, I have not seen, the description only says

"several oblique irregular streaks," very indefinite, but as this species is stated to have a double dark brown line below the white median streak, it should be readily separated.

I have two other specimens from Verdi, Nev., which do not seem to match any of the above and may be new, but await a larger series before describing.

Thiodia tenuiana, Wlsm.—One specimen, Regina, VIII., 13. This specimen is rather badly rubbed, but compares closely with an example so named by Prof. Fernald in the American Museum of Natural History. It is not quite like Walsingham's figure, which, with the closely allied species *parvana*, Wlsm., and *minimana*, Wlsm., are very poorly drawn, the descriptions are also so general that an actual comparison of the types will be necessary to properly separate them. Vein IV. of hind wing is entirely absent in this specimen.

Thiodia parvana, Wlsm.—Three specimens, Macleod, VI., 29, and Regina, VI., 10. I have but little hesitation in placing these specimens in this species; they agree with Walsingham's rather meagre description and indifferent figure, except that the hind wings are most distinctly fuscous rather than "very pale grayish white." Originally described from north Oregon, and not recorded since.

Thiodia refusana, Walk.—Two specimens, Regina, VI., 18. I feel certain of this identification, although both Walker and Walsingham's descriptions very inadequately describe this beautiful species. It closely resembles *Eucosma circulana*, Hbn., but can be quickly separated by the ♂ costal fold of the latter. The Regina specimens are yellowish-brown, or "cinereous-ochreous," except along the costa, which is whitish. The metallic lines are a dull leaden metallic, and form an almost perfect circle, involving nearly the entire outer third. Within the lower half of this circle is the ocellic spot composed of a cluster of velvety-black dots on a white field, and bounded outwardly on both sides and through the middle (vertically) by short metallic lines. In the upper half of the circle are three horizontal rows of black atoms. Between the circle and costa are a number of oblique metallic lines on a paler field; and through the middle of the wing, from base to circle, about one-third below costa, is a paler, nearly whitish line. The descriptions of *refusana* apply much better to *circulana*, especially where the ground colour is stated to be

"profusely irrorated with brownish scales." If further examination of Walker's type in the British Museum should show that it has a costal fold—the description states it is a ♂—*refusana* would fall as a synonym of *circulana*, and leave our present species without a name.

Thiodia triangulana, sp. nov.—Head and palpi cinereous or ashy-white, latter fuscous outwardly, thorax same, but posterior ends of scales and patagia cinereous.

Front wing divided into three nearly equal triangles, by two oblique fasciæ; the inner from dorsum at first quarter continuing obliquely two-thirds across the wing, the outer from centre of costa to anal angle.

Costa almost straight; outer margin oblique, 45°, straight in three specimens, very slightly concave in the fourth; dorsal margin evenly convex. III. and IV. of hind wing stalked from two-thirds to four-fifths, length of stalk is not constant.

Fore wing: Ground colour varies from dead white to white with an olivaceous tinge, with olivaceous-brown fasciæ, spots and irrorations. An inner narrow fascia arises from inner fourth of dorsum and points towards the inner of the three pre-apical costal spots, but ends abruptly just above middle of wing; it is more sharply defined outwardly than basally, and its outer margin is indented just above dorsum. The basal triangle within this fascia is thinly irrorated with the dark colour, more concentrated in a narrow line on costa, extending nearly to outer fascia and along the dorsal margin; below and paralleling the costa are a row of dots, duplicated in a shorter row below middle; between these are three faint horizontal lines, the lower one the most distinct, and in some specimens continuing outward, defining upper end of inner fascia, through outer fascia and ocellic spot. The outer fascia begins on costa and terminates in anal angle, before and defining ocellic spot; its inner edge is less sharply defined than its outer, and is nearly straight, being sharply indented below middle by a narrow spur of white; the outer edge curves outward as far as middle of wing, and below is sharply indented by the white ocellic spot. The basal triangle, thus enclosed, is crossed horizontally by faint lines of the dark colour, between the veins, the latter being white; the dark colour forms a shade along the dorsum and in one (the freshest) example a small spot on dorsum at outer two-thirds.

The apical triangle, above the ocellic spot is the whitest part of the wing, irrorated with fuscous below and interrupted on costa by three well-defined, large costal spots, the outer the largest; a line of pure white surrounds these spots on all sides except the costal. The ocellic spot occupies the lower half of wing, bounded outwardly by a narrow, irregular, silvery-metallic line, beyond which are two to four small black dots, the spot is white and is crossed horizontally by a row of dark dots above, a faint line and a dark shade below; the silvery-metallic outer line, in some specimens continues around below the spot and up on its inner edge, almost completely encircling it. Before the cilia is a pure white line, from just below apex to dorsal margin and before this is a slightly wider fascia of the dark colour, which continues into the apex. Cilia white, lightly dusted with the dark colour.

Hind wing: Smoky, fuscous, rather shining; cilia pale fuscous, with three very narrow basal lines, middle fuscous, outer and inner, whitish.

Under side: Front wing, dark, smoky fuscous, paler along dorsum and costal spots darker, faintly outlined with paler scales, a white dash between outer spot and apex. Cilia same as above and preceded by a pure white line. Hind wing. grayish fuscous, becoming darker at apex and with one apical and two small costal dark spots. Cilia same as above. Abdomen, above and sides grayish, below each segment black anteriorly, cinereous centrally and gray posteriorly, giving it a very striped appearance. Legs: Femora, whitish gray, tibiæ and tarsi cinereous.

Described from four ♂'s. Expanse: 20 to 24.5 mm.

Two from Regina, VII., 18 and 20, and two Aweme, Man., VI., 29, and IX., 31 (Norman Criddle). Co-types, U. S. Nat. Mus. No. 8206, Mr. Willing's and my collections.

Since writing the above I have received from Mr. Ernest Oslar, several additional specimens, collected in Platte Canon, Colo., VIII., 16, and three specimens from unidentified material in U. S. Nat. Mus., collected by Dr. W. Barnes, Glenwood Springs, Colo., Aug. and Oct. The latter are of bright ochreish-brown shades, Oslar specimens olivaceous-gray. The maculation of all are the same; the species has therefore a variation in colour, from ashy-gray, through the olivaceous-grays to a clear ochreish-brown. (To be continued.)

ASSINIBOIA MICRO-LEPIDOPTERA, COLLECTED BY MR. T. N. WILLING.

BY W. D. KEARFOTT, MONTCLAIR, N. J.

(Continued from page 48.)

Proteopteryx Willingana, Kearf.—Two additional specimens; Regina VII., 20. One strongly marked ♀ and one almost unicolorous ♂, the same as the types.

Ancyclis mediofasciana, Clem.—One specimen; Regina, VI., 18. Does not differ from Eastern examples; already recorded by Dyar from Kaslo.

Epinotia pseudotsugana, Kearf.—One specimen; Regina, VIII., 15. Not differing from my types. This species comes very close to *pinicolana*, Zell., differing principally in the front wings being of a dull leaden gray colour, while in *pinicolana* both ground colour and fasciæ are of bright brown shades. When describing this species I overlooked the palpi, the outer joint of which is entirely exposed, hence it should be placed in *Epinotia* and not *Cydia (Thiodia)*.

Cenopis reticulatana, Clem.—One specimen; Regina, VIII., 1. Less red than the Eastern examples in my collection. I am not aware of any previous record as far west as Regina.

Sparganothis puritana, Rob.; *vocaridorsana*, var. nov. Differing from *puritana*; in short central fascia, reaching only to middle of fore wing; entire absence of spot before outer margin, and in the costal spot doubled in width, covering costa from middle to apex.

Head, palpi and thorax yellow, much mixed with ferruginous, palpi paler on inner sides and above at base. Fore wing light yellow, paler than *puritana*. The spots and marks are a pinkish red, with a light purple tinge at some angles. A short basal dash of this color, below the costa and above the middle. A short fascia from costa at inner fourth obliquely to lower vein of cell, irregularly straight on its inner edge, the outer edge sharply and deeply indented by a spur of ground colour on upper half of cell. Costal spot begins at middle of costa and extends to, but does not involve apex, flatly triangular, its lowest point covering vein 7. A small discal spot. On dorsal margin are a few scattered reddish scales between outer third and anal angle, beginning with a tiny spot. Cilia tinged with pink. The costa from base to fascia is also narrowly edged with reddish. Hind wings evenly gray; cilia paler.

Under side fore wing: Yellow and ferruginous in a narrow band along costa, repeating the colours of the upper surface, below this dark

gray, cilia yellowish. Hind wings very pale gray, cilia a shade paler, preceded by a pale yellow line. Abdomen gray above; beneath, anal tuft and legs cinereous. Expanse 25 mm. Six ♂, Regina VI., 16; Aweme, VII., 10 (Norman Criddle) Winnipeg, (Hanham). Co-types, U.S. Nat. Mus., No. 8209, and my collection.

I have described this as a variety of *puritana*, but should not be surprised if it should prove to be a good species.

Archips cerasivorana, Fitch.—Three bred specimens, labelled "cherry web-worm," Medicine Hat, July. Not differing from specimens from the Middle and Western States.

Archips argyrospila, Walk.—One specimen; Calgary, VIII., 1. The dark form common to California.

Archips virescana, Clem.—One specimen; Regina, VIII., 13, very badly rubbed, but no doubt this species; common in the Eastern and Middle States, and also recorded from Arizona.

Archips persicana, Fitch.—Two specimens; Portage, VII., 10, and Regina, VII., 18. Darker than either Eastern Canada or British Columbia specimens, and with the white costal mark broader on the costa and more nearly resembling Zeller's figure of his *conigerana;* with a sufficient series showing this constant difference, I would be disposed to restore Zeller's name, at least to varietal rank.

Pandemis Canadana, sp. nov.—Fore wing very dark rusty brown, more or less overlaid with grayish-brown scales, with an oblique, purplish-black fascia from middle of costa to anal angle, a half-round spot of same colour on costa between fascia and apex, and an irregular basal band.

Head, palpi and thorax cinereous-gray sprinkled with darker specks. Antennæ cinereous. Fore wing rusty brown, overlaid with gray or grayish-brown, especially in basal patch and between it and central fascia. The dark scales in basal patch became more concentrated outwardly thus sharply defining the patch against the lighter ground colour which succeeds it; the outer edge begins at the inner quarter on costa, is slightly concave above and below median line, and convex outwardly on median line, widest on dorsal margin where it extends a third the length of wing and is shortly truncated. The central fascia is nearly straight, on its inner edge, from costa to middle, thence convex towards base for a quarter of its length, thence straight to dorsal margin, which it touches at two thirds; outer edge of this fascia concave on its upper quarter, thence nearly straight to anal angle; the lower, outer

half of this fascia more or less overlaid with ground colour and less sharply defined than inner edge and upper half. A broad, half-round spot on costa is the darkest of all the marks on costa. It covers between one-fifth and one-fourth the length of wing and leaves an equal division of ground colour on each side, between fascia and spot and spot and apex. On the costa are a number of short, hardly oblique, dark dashes; four or five in basal patch, two in ground colour succeeding it, three in fascia and two or three in ground colour beyond. A broken line of dark scales before outer margin. The fascia and spot are outlined by a lighter brownish-ochreous line. In one specimen the dark colour replaces the brown entirely, the spot and fascia being indicated only by the paler border lines. Cilia ground colour, preceded by a narrow dark line, the tips paler ochreous–brown. Hind wing and abdomen very dark fuscous, paler above cell, cilia pale fuscous. Legs cinereous, first and second pair clouded with gray-brown in front. Expanse, ♂, 19 to 21 mm.

♀ marked same as ♂, but all marks nearly obsolete and indicated more by the darker outer lines than their internal colour. Expanse, ♀, 24.5 mm.

Eight ♂ ♂, Regina, VIII., 13 to 15; St. Albert, VII., 20; Aweme, VII., 31, to VIII., 15, (Norman Criddle.) One ♀, Regina. Co-types, U. S Nat. Mus., No. 8208, Mr. Willing's and my collection.

I at first identified these specimens as an unusually dark form of *Pandemis limitata*, Rob., but the outline of the basal patch and central fascia are quite different and are sufficient to warrant separation, even if there were not such a considerable difference in the colour. The outer line of the basal patch ranges from nearly straight to slightly indented below the middle in *limitata*, while in *Canadana* this line is deeply scalloped above and below the middle. In *limitata*, the inner edge of central fascia is straight, with, in some specimens, a small tooth projecting at a third below costa, while in *Canadana*, this line bulges out widely below the middle. The fascia of ground colour between basal patch and central fascia is much narrower in *limitata*, with sides nearly straight.

Tortrix Alleniana, Fern.—Four ♂, Regina, VIII., 13 and 15; Macleod, VII., 2; two ♀, Lethbridge, VII., 11; one ♂, bred, Medicine Hat, larva on poplar, V., 30; pupated VI., 7; issued VI. 20. Prof. Fernald has kindly loaned me two ♂ and one ♀ types of this species, and while the ♀ ♀ cannot be separated and compare exactly, the ♂ ♂ have necessitated a very considerable amount of study, and I should not be surprised if additional material from points between Regina and

Maine would prove the existence of two good species, especially if a ♀ form should be found constantly different from the ♀ of *Alleniana*.

The fore wings of the ♂ types of Alleniana are yellowish-brown, very finely and lightly reticulated with a darker shade of brown, an oblique fascia from centre of costa in one specimen extends barely to cell, and in the other is obsolete; on costa before apex is a faint indication of a spot. The hind wings are immaculate, of a very light buff shade. Several of the Regina ♂ ♂ compare closely with the types, except that the central fascia is strongly developed, continuing down to and disappearing just above the anal angle, while the pre-apical spot is large and dark, and has a tendency to run into a curved sub-marginal darker shade that involves the outer margin. The balance of the ♂ specimens have distinctly grayish-brown fore wings, with reticulations, fascia and marks the same; but the hind wings are fuscous, with the pale straw colour costal and apical borders finely reticulated. I think it quite likely that this is the species referred to in a letter from Dr. Fletcher (VII., 15, 1904) that is suspected of doing considerable damage to the *Populus tremuloides* of the Northwest. I should like to have given the name *populana* to this species, but find it impossible to separate from *Alleniana* with the material before me.

Tortrix symphoricarpana, sp. nov.— ♂, 27 mm. Head and palpi grayish-tawny-brown, outer ends of scales and outer joint of palpi dark slaty brown; thorax and front wing tawny-brown or grayish-yellow. An oblique, blackish-purple fascia from middle of costa to hind margin before anal angle, narrowest on costa; indented and partly interrupted on upper median vein, inner edge well defined, nearly straight but swelling out slightly in cell, with two very slight indentations, one at middle of cell and one on median vein, slightly concave below cell; outer edge of fascia less distinctly defined, the dark colour becoming paler and approximating the ground colour; indented between costa and upper median vein, below latter convex to before anal angle. A duplicate spot on costa half way between fascia and apex, somewhat triangular but rounded on inner edge, and is twice as wide on costa as fascial spot on costa, most intense on inner edge; from lowest point of spot is a dark, outwardly curved, much broken line to anal angle; several short, vertical reticulations between this line and outer margin, crossed by horizontal reticulations. The balance of the wing is coarsely reticulated vertically, in the type there being seven points touching the costa between base and fascia and three between fascia and costal spot. Cilia tawny-yellow. Hind wing pale cinereous, clouded basally and dorsally with fuscous, and apically

with ochreous. Cilia paler. Under side front wing light tawny brown below costa and before outer margin ; central part of wing from base to end of cell, dark, brownish fuscous. The reticulations of upper side are duplicated on costa and outer margin, with three well-defined short costal streaks beneath the inner and outer edge of fascia and inner edge of costal spot. Abdomen grayish-brown, tuft ochreous, legs pale ochreous.

♀, 25 mm. Marked generally same as ♂, but ground colour is darker brown, causing the fascia and spot to be less distinctly defined; the reticulations are also more obscure, except between the submarginal line and outer margin they are more distinct and form a submarginal dark shade. Hind wings slightly paler. One ♂. Two ♀. Medicine Hat, VII., 21, from larvæ on Snowberry, *Symphoricarpa*, sp. Co-types U. S. Nat. Mus., No. 8207, and my collection.

The maculation of this species is very much like Robinson's figure of *Archips zapulata*, except that the dark basal area shown on the figure is entirely absent. It is also very much darker than *zapulata*, and as the ♂ has no costal fold, it cannot even be referred to the same genus.

Tortrix pallorana, Rob.—Twelve specimens, Lethbridge, VII., 11, Regina, VII., 10, to IX., 2. ♂'s average 25 mm ; ♀ 30 mm. I have so far found it impossible to satisfactorily separate Robinson's two species, *pallorana* and *lata*. Mr. Willing's specimens agree in size with *lata*, but in colour and shape they are nearer *pallorana*, although they do not exactly agree in any one particular with either, except that the fore wings are immaculate. We may have a new species, but I should hesitate describing it without very much more complete data of the larval stages. *Pallorana* is on record as bred from *Verbena* and *Cerasus*.

Tortrix albicomana, Clem.—One specimen, Lethbridge, VII., 11; The canary-yellow form, rather heavily overlaid with pale purple scales, concentrated in two half fasciæ from costa and a whole fascia before the cilia on the outer margin. It is the intermediate form, between the type, which is the palest canary-yellow, and the other extreme, where the whole fore wing is overlaid with deep lustrous purple, excepting a short basal yellow patch, continuing in a line along the costa and running into the outer marginal yellow fascia. I have recently separated this form, calling it var. *semipurpurana*. This Regina specimen is of the form commonly bred on Rose, and which has usually been mistaken for *bergmanniana*, Linn. I have considerable doubt that the latter really occurs in America.

MOSQUITO NOTES.—No. 3.

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In a very interesting collection of mosquitoes lately sent me from the Philippine Islands by Dr. Eugene R. Whitmore, 1st Lt. Asst. Surg. U. S. A., occur a couple of forms which seem entitled to position as new genera, and some others of merely specific interest. The new genera are separated, in the first instance by a combination of values that makes it seem secure, while in the second case it lies between Finlaya and Macleaya, and the differences are not so marked.

Reedomyia, nov. gen.—Head covered with slender curved scales, forked scales on the occiput, and flat lateral ones, as in Culex; palpi two jointed in the female; thorax clothed with curved scales; scutellum with broad flat scales only; metanotum nude; fork cells of wing short.

The genus is named after Major Walter Reed, Surgeon U. S. A., whose invaluable work in proving *Stegomyia fasciata*, Fab., the intermediate host in the transmission of "yellow fever" is too well known to need more than mention.

Reedomyia Pampangensis, n. sp.—♀. Head densely covered with slender curved scales and flat lateral ones; a brown triangular (base caudad) median spot bordered by a white stripe, followed laterally by brown scales and then by lateral white flat scales, no tuft of scales between the eyes, but many bristles around the eyes, and a border of curved light-yellow scales around the eyes, fork scales numerous and extending well up on the vertex; antennæ brown, verticels and pubescence brown, basal joint light brown and partly brown scaled, first joint has a few brown scales; palpi brown, somewhat constricted at base of ultimate joint; proboscis brown dorsally, and fawn coloured ventrally to about three-quarters its length, apical quarter dark, tip brown; eyes brown; clypeus brown.

Thorax when viewed directly from above is of general reddish brown colour and darker in other lights; prothoracic lobes testaceous with white slender curved scales and dark brown bristles. In these specimens, as in some others lately received, these lobes appear to be stalked, the stalks running in a curve up the cephalic aspect of the thorax, and the "lobes" on the dorsal end as a cap, reminding one somewhat of a "mushroom." Mesonotum is a light reddish brown with light yellow and dark brown slender curved scales rather indefinitely arranged—an indefinite white

Fig. 2a. Ceuthophilus pallidipes, ♂, terminal segment of abdomen (× 10).
2b. " " " subgenital plate, from below (× 10).
2c. " " " subgenital plate, lateral view (× 10).

Plate V.

Fig. 3. Ceuthophilus neglectus, ♂, Scudder's type (× 3).
3a. " " " terminal segments of abdomen (× 10).
3b. " " " subgenital plate, from below (× 10).
3c. " " " subgenital plate, lateral view (× 10).
4. " terrestris, " Isle d' Orleans, P. Q. (× 3).
4a. " " " terminal segments of abdomen (× 10).
4b. " " " subgenital plate, from below (× 10).
4c. " " " subgenital plate, lateral view (× 10).

ASSINIBOIA MICRO-LEPIDOPTERA, COLLECTED BY MR. T. N. WILLING.

BY W. D. KEARFOTT, MONTCLAIR, N. J.

(Continued from page 93.)

Tortrix conflictana, Walk.—Five specimens; Lethbridge, Macleod and Pine Creek; VII., 8, to VII., 13. Larger and the bands more suffused than Eastern specimens.

Tortrix argentana, Clerck.—Three specimens; Macleod and Lethbridge; VIII., 8 to 15. I have a long series of this species from Western America, south nearly to Mexico, and north to British Columbia, likewise a series from Europe, and every time I examine them I am impressed with the feeling that our American species differs from the European, but further study is required before deciding either way, in the meantime the European name can stand. This Tortrix is easily mistaken for *Crambus perlellus*, Scop. See comparative notes under the latter name.

Eulia triferana, Walk.—Two specimens; Regina, VI., 8 to 20, rather badly rubbed, but matching exactly Eastern examples in my collection under this name; this species is either the most variable of all Lepidoptera or else a good many more than one have been lumped under the one name. This is the most Western record I know of.

Phalonia angulatana, Rob.—One specimen; Regina, VI., 18. New Western record, common in the Eastern States, and recorded from Texas.

PYRALIDÆ.

Nomophila noctuella, Schiff.—One specimen; Regina, IX., 5. Common in all known regions of the world.

Loxostege chortalis, Grt.—Six specimens ; Regina, VI., 18. Rather common, wherever it is found, from North Atlantic States westward. A dainty quaker-gray species, with fine rippling lines of a darker shade.

Pyrausta submedialis, Grt.—Nine specimens ; Regina, VII., 11, to VIII., 11. Eight of typical light form, one very dark, lines almost obsolete.

Pyrausta unifascialis, Pack.—Three specimens ; Calgary, VI., 6 ; Macleod, VII., 2; Saltcoats, (?) VII., 13. This is quite common throughout the West, and is subject to a very wide range of variation, both in size and colour, as the several synonyms indicate.

Pyrausta fodinalis, Led.—Three specimens; Macleod, VI., 28–VII., 2 ; Calgary, VII., 6.

Pyrausta ochosalis, Dyar (not Fitch).—Two specimens ; Macleod, VII., 3 ; Pine Creek, VII., 11. Recorded from Kaslo, by Dyar, and very well represented by fig. 57, plate XLVII., in Holland's Moth Book.

Loxostege sticticalis, Linn.—Twelve specimens ; Regina, VI., 8, to VIII., 15 ; Calgary, VII., 6 ; Abernethy, VI., 27 ; Indian Head, VI., 29. This common species is found throughout the Middle Northwest.

Loxostege commixtalis, Walk.—Two specimens ; Regina, VI., 18, very similar to preceding, but can be separated by the yellow outer marginal line which widens into a narrow irregular fascia, and the presence of numerous short horizontal black lines and dots.

Cornifrons simalis, Grt.—One specimen ; Lethbridge, VII., 11. Recorded by Dyar, from Kalso, previous records Montana and Oregon. I have a long series from Utah (Poling).

Scoparia centuriella, Schiff.—Three specimens ; Lethbridge, VII., 11. Pine Creek, VII., 13 ; Calgary, VIII., 1.

Pyralis farinalis, Linn.—One specimen ; Lethbridge, VII., 11. This is the common Grain-moth treated of in all lists of injurious insects; it probably feeds on a number of roots and stored foods ; I have bred it from dried Tulip and Crocus bulbs.

Crambus plumbifimbriellus, Dyar.—Five specimens ; Lethbridge, VII., 11.

Crambus perlellus, Scop.—Nine specimens ; Regina, Lethbridge, Macleod and St. Albert, VII., 3, to VIII., 15. This pure pearly-white Crambid is reported by Dr. Fletcher and Mr. Willing to occur in myriads, every step through the grass of the prairie lands disturbing dozens. This species is very often confounded with *Tortrix argentana*, Clerck. The

coloration and size of both are identical, and they can only be separated by structural characters. The easiest to observe is the length of the palpi, which in the Tortrix is hardly as long as the head, while in the Crambid the palpi project forward between two and three times the length of the head.

Crambus pascuellus, Linn.—Two specimens; Lethbridge, VII., 11. I have no Eastern or European examples of this species, it compares exactly with a long series from Verdi, Nev., (Vachell), and South Utah, (Poling). Fernald states that the larvæ feed on grass, and habitat from Massachusetts to California and Europe.

Crambus trisectus, Walk.—Seven specimens; Regina, VIII., 13. Do not differ from a long series from Colorado (Nash), Manitoba (Heath), and other Western localities. Can be easily identified, as it is one of the largest of the pale- or ashy-brown species without metallic ornamentation, with two oblique darker brown lines parallel to outer margin, one about middle of wing, the other between it and margin; these dark lines are easily rubbed off, and while some specimens show only the costal half, in others it is almost obliterated. Fernald's figure, in Crambidæ of North America, is as much unlike this species as it is possible to draw it.

Thaumatopsis Fernaldella, sp. nov.—Head, palpi, thorax, abdomen, egs, and front wing, light ochreous-brown, or pale fawn-colour.

Front wing: A darker shade of brown along costa from base to inner third.

A median white streak from base to end of cell, beginning at base as a line and widening on its lower edge until it involves the whole width of cell at its outer end. The lower edge of this streak overlaid with a line of dark brown scales and a shade of lighter brown above the dark line. Above the white streak is a brown shade from inner third to apex, interrupted at end of cell, a thin, very dark line between this shade and the white. Beyond end of cell the white streak is outlined by a brown shade forming an abbreviated transverse fascia.

A narrow white sub-terminal fascia, overlaid with silvery-metallic scales from dark shade to dorsal margin, is bounded inwardly and outwardly by brown lines. Between end of cell and sub-terminal line, the veins are white, vein vii. being most pronounced and the white line over this vein is the one that interrupts and indents the brown shades above median white streak. A short, oblique streak of brown on middle of dorsal margin. On costa, before apex, a pale spot, and adjoining it

towards base a slighter darker spot, both of which are the terminations of faint, almost obsolete lines of these colours lying above dark median shades. Seven dark purple or black dots on extreme outer margin, one at end of each vein, the space between these dots and sub-terminal line, ground colour, not crossed by white or brown lines. Cilia white, dotted with fuscous, and with a narrow, silvery-white metallic line at its base, through which runs a thin line of fuscous.

Hind wing: Above and beneath pale fuscous with a purplish reflection, in some specimens nearly white towards base; cilia white. Under side front wing brownish-fuscous.

Antennæ pectinate in ♂. Expanse 23 to 31 mm.

Sixteen specimens; Anglesea, N. J., June and September; Key West, Fla.; Las Cruces, N. M., (Cockerell 2071); Walter's St., Cal., April, (J. B. Smith); Yellowstone Park, Wyo., July, (H. S. Burrison); Fort Collins, Colo., August, (C. F. Baker); South Utah, July, (W. Barnes, M. D.). Co-types U. S. Nat. Mus., No. 8218; collections of Prof. Fernald, and my collection.

The Key West specimen is the most strongly marked; it differs from all of the others in several particulars, notably: The transverse median line is well defined and continued to dorsal margin, but interrupted between each vein; between the dorsal margin and median streak are a number of white horizontal dashes and the sub-terminal line curves inward to a greater degree, leaving a much wider space between it and termen. This specimen is, therefore, included with a question mark.

Fernald's figure of *T. edonis*, Grt., very fairly represents the markings of the front wings of typical specimens, and I should have been inclined to refer my specimens to Grote's species, but Prof. Fernald assures me that they are not the same, and I take pleasure in bestowing his name on this widely-distributed species.

I have specimens from Mr. Willing that are marked very much the same as *Fernaldella*, but the colours are ashy-gray, with no ochreous shades, these may prove to be a distinct species, but I prefer to regard it at present as a variety.

Thaumatopsis Fernaldella, var. *nortella*, var. nov.—Palpi pale gray, heavily speckled with dark purplish; antennæ same, pectinate in ♂; head and thorax cinereous.

Fore wing: Ashy-gray, with median white streak and dark shades same as *Fernaldella*, but latter much more intense, nearly black. The transverse dark shade at end of cell is absent, and the white median streak

continues outward to termen, in a broad white shade. The sub-terminal line is obsolete and the row of black dots nearly so. Hind wings less white and more whitish-purple or ashy-white.

Seven specimens; Regina, VII., 20, to VIII., 13; Lethbridge, VII., 11; Pincher, VII., 10. Co-types, U. S. Nat. Mus., No. 8219; Mr. Willing's collection and my collection.

Ambesa lætella, Grt.—Two specimens; Regina, VII., 20.

Laodamia fusca, Haw.—Three specimens; Regina, VIII., 13.

Epischnia Boisduvaliella, Gn.—Four specimens; Regina, VI., 18; VIII., 13, and IX., 2.

Hulstia undulatella, Cl.—Four specimens; Lethbridge, VII., 11.

Homœosoma electellum, Hulst.—One specimen; Regina.. Bred from larva on buds of *Grindelia*. Larva, IX., 19; issued X., 5. . Accompanying this specimen is a very well preserved larva, and at the request of Dr. Dyar I make the following brief description:

Length, 11 mm. Robust, cylindrical, thoracic segments tapering to head. Diameter through abdominal segments, 2 mm.; width head, 1 mm. The larva is very beautifully marked with five purple and four yellow streaks from head to anal segment. The dorsal stripe is purple, one sub-dorsal and one sub-spiracular on each side of the same colour. Between these bands are yellow stripes of about half the width of the purple; doubtless the yellow of the dried larva was a dull or light green when alive. Ventral region dull ochreous-yellow (also green naturally?).

Head: Small, rounded, retracted, not outstretched, light chestnut brown, mouth-parts and ocellic field dark brown and a horizontal black streak caudad from latter on each lobe, ocelli pale luteous, raised like tiny drops of dew. Antennæ either very short or broken off of this specimen. Clypeus high, sides straight, triangularly to a point at top of head. P. t. shield large, chitinous, shining ochreous, with a posterior black line on dorsum, extending down on each side and enlarging into an ovate black spot; narrowly surrounding this spot, except posteriorly, is a pale yellow line. Thoracic feet very dark brown or black, short. Four pairs abdominal and one pair anal feet, crochets well developed, in closed circles, hooks brown. Anal shield small, hardly chitinous, cinereous. Setæ short. Tubercles: Abdominal segments: i. very slightly dorsad to ii.; iii. dorsad and slightly caudad to spiracle; iv. and v. ventrad to spiracle, close together, vertical to each other, but not on same plate; vi. and vii. in usual positions: Meso-thoracic segment; ia. & ib.; iia. & iib.

Peoria approximella, Walk.—One typical specimen; Regina, VII., 20. I am indebted to Dr. Dyar for names of all Phycits.

YPONOMEUTIDÆ.

Choreutis extrincicella, Dyar.—One specimen; Regina, VI., 24. Exactly the same as type, can be easily separated from any other species of this genus, by the narrow white transverse line beyond base, and the radiating white lines in outer quarter.

GELECHIIDÆ.

Gelechia variabilis, Busck.—One specimen; Regina, VIII., 15.

Gelechia albisparsella, Cham.—Three specimens; Lethbridge, VII., 11.

Gelechia nigrimaculella, Busck.—One specimen; Regina, VIII.,23.

Gelechia ornatifimbriella, Clem.—One specimen; Regina, VI., 18.

Gnorimoschema triocellella, Cham —Seven specimens; Regina, V., 15, to VI., 15.

Trichotaphe juncidella, Clem.—One specimen; Regina, VIII., 15.

Ypsolophus ligulellus, Hbn.—One specimen; Regina, IX., 2.

ŒCOPHORIDÆ.

Depressaria argillacea, Wlsm.—One specimen; Regina, IV., 29.

Semioscopsis inornata, Wlsm.—One ♀; Red Deer, IV., 18. This species has also been recently received from Mr. Heath and Mr. Criddle, and fully bears out Dr. Dyar's conclusions (*ante* xxxiv., p. 319), that it is distinct. It more nearly resembles a large gray Geometrid, and seems much out of place in the Micro-Lepidoptera. I believe this is the first record of capture since the original description. In Bul. 52, U. S. N. M., the locality is "unknown."

TINEIDÆ.

Tinecola bisselliella, Hum.—Two specimens; Regina, VI., 7–8. The common clothes moth.

Tinea croceoverticella, Cham.—Two specimens; Regina, V., 29–VI., 3, labelled "in house." I am not entirely certain of this identification.

Tinea granella, Linn.—One specimen; Regina, VI., 15. Rather badly broken, but the identification seems good.

Besides the above, there are two or three species that I cannot make out at this time.

Since completing the above notes Mr. Willing has been good enough to send me a large map of a part of the Northwest Territories, from which I add the following to better identify the localities mentioned.

Regina and Indian Head are in the Eastern part of Assiniboia, about the middle of the great wheat belt.

Medicine Hat is in the Western end of the same Province.

Lethbridge, Macleod and Pincher are just above the United States line in the Southern end of Alberta.

St. Albert is the Northern terminus of the Calgary and Strathcona (Edmonton) branch of the C. P. R., and nearly the Northern end of Alberta.

Pine Creek is in Alberta, between Macleod and St. Albert.

From the apparent topography, I assume all of the Assiniboia localities are in the great stretch of prairie land, which likely partially continues into the Eastern half of Alberta ; Pincher and Pine Creek are in the lower foot-hills, and St. Albert in the vast forest and lake districts of the Northwest.

THE GENUS VENUSIA AND ITS INCLUDED SPECIES.

BY RICHARD F. PEARSALL, BROOKLYN, N. Y.

If it were necessary to emphasize the need of revision in the Geometrina, the genus Venusia furnishes an excellent example. It was established by Curtis, an English writer, in 1839, with *cambrica*, Curt., as its type. Since that time, three additional species, according to Mr. Meyrick, from New Zealand have been placed under it. In our own fauna, Dr. Hulst placed three species as its representatives—*cambrica*, Curt., *comptaria*, Walk., *duodecimlineata*, Pack. *Cambrica*, the type, has a world-wide distribution. It flies in England, in Northern Europe, across Northern Asia, in Japan, and in the north temperate zone of America. *Comptaria* is found in Canada, the mountainous regions of New England and New York, and along the Appalachian range as far south as Pennsylvania and probably farther; *duodecimlineata* comes from northern California, and with it, under this name, have been associated examples taken in British Columbia; and another series found in the East, ranging from the vicinity of New York City, southward into Pennsylvania and probably into the hill regions beyond. During many years collecting in the Catskill Mountain region, I have never taken it there, while *cambrica* and *comptaria* were abundant.

Briefly, I will state that the chief distinguishing character of Venusia, is the bipectinate antennæ of the males. In the group I have mentioned, *cambrica* is the only species possessing this structure, and it is my opinion, that here, as in Europe, it is the sole representative of its genus. *Comp-*

taria has the male antennæ filiform and strongly ciliate beneath, hence its place is in the allied genus Euchoeca, Hüb., with which in other respects it perfectly agrees. *Duodecimlineata* was stated by Dr. Packard to have pectinate antennæ (Monograph of Geometrid Moths, 1876, page 83), where he characterizes the genus Epirrhita, Hüb., under which he places it, but in his description (page 84), he states merely that they are "well ciliated." In both he was correct, but he failed to observe that his species possessed that anomaly in construction, *unipectinate* antennæ, the single row of pectinations beneath, being flanked on either side by a row of cilia, and tipped with a fascicle of hairs, the apex being simple. For some time I tried to convince myself that they should be called serrate, but the pectinations are long and proceed from the centre of each joint, and are not an enlargement of either end. This structure removes it from Venusia, and necessitates the erection of a new genus, since, so far as I am aware, none has been established to cover the requirements found in its construction. I give it, therefore, a name, NOMENIA, n. g., and the species will be known as *Nomenia duodecimlineata*, Pack. It is defined as follows :

NOMENIA, n. g.

Palpi short, slender, scaled ; front rounded, smooth scaled ; tongue developed ; antennæ of ♂ unipectinate, pectinations tipped with a fascicle of hairs, and on each side a row of cilia, apex simple, in ♀ filiform simple, thorax and abdomen untufted ; fore tibiæ unarmed, hind tibiæ with all spurs in both sexes slender, without hair pencil in ♂ ; fore wings, one accessory cell, 12 veins, 3 and 4 separate 6 and 7 from point ; hind wings 8 veins, 3 and 4 separate 6 and 7, long stemmed, 8 with cell to beyond middle.

It seems strange that this species should have passed under the hands of many able observers, and yet that this antennal feature should have been unnoticed, and stranger still that the forms from British Columbia, and from the East, with their simple ciliate antennæ in the males, should have been so long associated with it. These latter are one species, which belongs to the genus Euchœca, Hüb., and is nameless. The ground colour is paler, and, as is frequently the case, the Western form is larger, but aside from this I can find no difference in structure or markings. It will be known hereafter as

Euchœca salienta, n. sp.—Of the same form with its congeners, the ground colour of both wings above, pale ashen in Eastern, nearly white in Western specimens, sparingly mixed with dark brown or black scales.

MANITOBA MICRO-LEPIDOPTERA.

BY W. D. KEARFOTT, MONTCLAIR, N. J.

The following list of Micro-Lepidoptera taken in the Province of Manitoba, is published for the purpose of recording the distribution of species, as well as an incentive to the collectors of the locality to make more than ordinary efforts to add to the number. The work that has already been done is most gratifying, and compares very favourably with local lists of many of the States, from which a great deal more would have been expected. For instance, the number of Tortricids alone exceeds the number credited to the State of New Jersey, in Prof. John B. Smith's list of 1899. But even in this family I have twenty-five or more additional species which appear to be new, but that are not described at the present time owing to the fact that most of them occur as only one or two specimens of a kind, and oftentimes more or less rubbed. I am quite sure that the work of another year or two will enable us to establish a list of Tortricids from this one province alone of not less than two hundred and fifty species. The same proportions will probably follow in the other families embraced under this general head. Collectors must not forget that each different manner of collecting produces results not found in any other way. Daylight with net, sugaring and light at night, and most valuable, breeding from the larvæ, also different hours of the day must be worked. Some species fly only very early in the morning, others only at twilight; likewise different localities, such as the prairies, along streams, in thickets and underbrush, and in the woods or forest, each will contribute some species not found elsewhere. The proof of these remarks will be found in the localities given in the lists below, regardless of how small the numbers were. Each collector has secured species not found by some or any of the others, showing the result of work along individual lines in favourite spots or methods.

I take pleasure in acknowledging my indebtedness to the following gentlemen for the privilege of studying and making record of their captures, as well as for the many specimens they have generously permitted me to retain :

Mr. E. Firmstone Heath has for several years sent me his captures, all of which are recorded under the name *Cartwright.*

Mr. Norman Criddle has sent me a very large number of most interesting species, all of them most beautifully and carefully expanded His captures are recorded as *Aweme.*

June, 1905.

From Mr. A. T. Dennis, of *Beulah*, a small but interesting lot.

Through your—I must say *our*—well-beloved Dominion Entomologist-in-Chief, Dr. Jas. Fletcher, a very carefully prepared lot of specimens from Mr. L. E. Marmont, recorded as from *Rounthwaite.*

Through the courtesy of Dr. H. G. Dyar, a small lot of unidentified material from the National Museum, collected by Mr. A. W. Hanham, under the localities *Winnipeg* and *West Manitoba.* Also a few indifferent specimens collected by a couple of small boys at *Wattsview* and *Souris.*

In regard to the identifications, I would say: In the Tortricids I am entirely responsible for the names. The Pyralids have in a few cases been directly identified by Prof. Fernald, the balance named from my own collection, which, however, was also largely named by him. This also applies to the Crambids. The Phycits have been largely determined by Dr. Dyar. The Pterophorids I have worked out entirely by the synoptic tables in Fernald's Monograph of this group, comparing where possible with figures in Walsingham's "Ptero. of Cal. and Ore." Some of these names may have to be corrected, as synoptic tables at their best are very far from perfect. In the Tineid families, those that have been named have been identified by comparison with typical examples in my own and the National Museum collection. Many species, however, yet remain to be identified, and I purpose entering seriously into this work as soon as I have got the Tortricids in fairly good order.

In brackets, after many of the species, I have added the localities hitherto recorded, so far as I know them. A particularly noteworthy fact of this list is, that the Manitoba fauna seems to embrace species from both the coast and foothill districts of the Pacific Slope, from Texas and from the Eastern States, as well as a number of the European species that are accredited to North America.

The descriptions of the new species of Tortricids will follow the general list, with the hope that within the additional time permitted, more specimens of some of them will have been received.

Exartema olivaceanum, Fern.—Rounthwaite, July; Aweme, VII, 23 to 27. Recorded from Eastern States.

Exartema atrodentanum, Fern.—Aweme, VII, 23; Winnipeg. (Ohio to Texas.)

Exartema inornatanum, Clem.—Rounthwaite, July; Cartwright; Aweme, VII, 23. (Atlantic States.)

Olethreutes nimbatana, Clem.—Cartwright, VII, 10. This species is scarcely separable from *O. consanguinana*, Wlsm. The latter has a more or less obsolete paler fascia through the middle of the dark basal area, and is a little larger in size (No. Atl. States.)

Olethreutes capreana, Hbn.—Aweme, VII, 12 to 20; Cartwright; Rounthwaite, July.

Olethreutes dimidiana, Lodsf.—Cartwright, one specimen, no date. Agrees with all other American specimens in my collection from the Atlantic States and as far west as Arkansas, but none of them agree with European examples. Further study may warrant separation.

Olethreutes deceptana, Kearf.—Aweme, VII, 24, to VIII, 8; Winnipeg.

Olethreutes hebesana, Walk.—Aweme, VI., 2. (Northern U. S.)

Olethreutes cyanana, Murtf. — Rounthwaite, June. (Penna. to Kansas.)

Olethreutes hemidesma, Zell.—Rounthwaite, June. I have bred this species from larvæ found in the beautiful pink flower heads of *Spiræa tormentosa*, during early July in New Jersey. (Maine to California.)

Olethreutes duplex, Wlsm.—Aweme, VII, 12; Cartwright; Winnipeg. (Colorado.)

Olethreutes nubilana, Clem.—Rounthwaite, July; Cartwright; Winnipeg. This is the species that I incorrectly identified as *O. vetulana*, Wlsm., *ante*, p. 43. The two species seem very much alike. I now have a very long series of Eastern and Canadian specimens, all of which agree with Clemens's type and description. I have only two rather badly rubbed California specimens, and await perfect material from this latter locality before deciding whether both species are good, or that *vetulana* is a synonym. (Penna. to Wis.)

Olethreutes coruscana, Clem. — Rounthwaite, July; Winnipeg; Aweme, VIII, 9 and 15. This identification is subject to correction. The Aweme specimens have white hind wings, reticulated with fuscous around the edges, while the Rounthwaite specimen is darker than any Eastern specimens I have. There seems to be a tendency for all four of these allied species, *chalybeana*, Wlsm., *coruscana*, Clem., *constellatana*, Zell., and *major*, Wlsm., to intergrade. (No. Atlantic States.)

Olethreutes instrutana, Clem.—Aweme, VII, 15 to 31; Beulah, VII, 15; Cartwright. (No. Atlantic States.)

Olethreutes campestrana, Zell.—Rounthwaite, July; Beulah, VIII, 15; Cartwright; Aweme, VI, 27, to VII, 9. (No. Atl. States.)

Olethreutes fuscalbana, Zell.—Aweme, VI, 13, to VII, 22. (Maine to Ohio.)

Olethreutes glaciana, Mschl.—Cartwright, VII, 1. (Ontario and Labrador.)

Olethreutes dilutifuscana, Wlsm.—Cartwright. (Oregon.)

Eucosma Morrisoni, Wlsm.—Rounthwaite, July; Aweme, VI, 25 to 29; Beulah.

Eucosma Ridingsana, Rob.—Rounthwaite, July; Beulah, VIII, 1. (Texas to Canada.)

Eucosma circulana, Hbn.—Rounthwaite, July; Cartwright; Souris.

Eucosma occipitana, Zell.—Beulah, VII, 15; Cartwright; Rounthwaite, July. Type from Texas, not since recorded.

Eucosma culminana, Wlsm.—Rounthwaite, July; Beulah, VIII, 15; Winnipeg. Most Eastern record.

Eucosma passerana, Wlsm.—Aweme, VI, 27. Type from California, not since recorded.

Eucosma vertumnana, Zell.—Rounthwaite, June; Aweme, VIII, 8. (New York and Texas.)

Eucosma nisella, Clerck.—Rounthwaite, August. I retain this name for the present, but am not convinced that the European and American species are the same.

Eucosma abbreviatana, Wlsm.—Aweme, V, 21, to VI, 6. (Mass. to D. C.)

Eucosma solicitana, Walk.—Aweme, VI, 16. (No. Atl. States.)

Eucosma illotana, Wlsm.—Aweme, VI, 15 to 25; Cartwright. (Oregon.)

Eucosma Scudderiana, Clem.—Aweme, VI, 18. (No. Atl. States.)

Eucosma dorsisignatana, Clem.—Aweme, VIII, 15 to 22; Cartwright. (Eastern States.)

Eucosma confluana, Kearf.—Aweme, VIII, 12.

Eucosma graduatana, Wlsm.—Aweme, V, 31. In Dyar's Catalogue, as well as in Fernald's Catalogue*, *graduatana* is made a synonym of *dorsisignatana*. The Aweme specimen is very close to Walsingham's figure and description, the hind wings are rust-red, the shape and size of spots on fore wing are similar, the specimen is little more than half the size of the latter, and it occurs in May, while *dorsisignatana* is a late summer or fall species. If Walsingham's figure is a fair representation of

*Trans. Am. Ent. Soc., X., p. 42, 1882.

his type, I have no doubt that this Aweme specimen is his species, and also that it is most decidedly distinct from *dorsisignatana*. Type from Texas.

Eucosma glomerana, Wlsm.—Aweme, July. Type from Texas, not since recorded.

Eucosma corosana, Wlsm.—Rounthwaite, July; Beulah, VII, 15. Type from Montana, and not since recorded.

Eucosma juncticiliana, Wlsm.—Aweme, VII, 26, to VIII, 15. (Northern U. S.)

Eucosma argentialbana, Wlsm.—Beulah, VII, 15; Aweme, VI, 6, to VI., 29; Rounthwaite, July. (Texas.)

Pseudogalleria inimicella, Zell.—Aweme, VI, 16; Beulah. New Western and Northern record for this species.

Thiodia striatana, Clem.—Rounthwaite, June. (Atlantic States.)

Thiodia dorsiatomana, Kearf.—West Manitoba.

Thiodia pallidicostana, Wlsm.—Aweme, VI, 16, to VII, 27; Beulah, VII, 15; Winnipeg; Cartwright.

Thiodia tenuiana, Wlsm.—Aweme, VI, 16. Rounthwaite, June.

Thiodia triangulana, Kearf.—Rounthwaite, July; Aweme, VI, 29.

Thiodia infimbriana, Dyar.—Aweme, VIII, 13; Cartwright; Rounthwaite, July; Winnipeg.

Thiodia refusana, Walk.—Rounthwaite, May; Aweme, V, 20 to 27.

(To be continued.)

NEW SPECIES OF PHLEPSIUS AND RELATED GENERA. (HOMOPTERA).

BY E. D. BALL, UTAH AG. COLL., LOGAN.

Phlepsius Slossoni, n. sp.—Form and general appearance of *lippulus* nearly, slightly larger and darker, with a much longer, flatter vertex. Length, 6 mm.; width, 2 mm.

Vertex slightly acutely angled, the apex truncate, nearly twice longer on middle than against eyes, the disc concave, anterior margin sharp and broadly foliaceous, the line between this foliaceous margin and the front proper being sharply marked. Front slightly convex, evenly narrowing to the apically expanded clypeus. Elytra moderately long, appressed behind the middle, the apices slightly flaring. Venation obscure.

Colour: vertex pale fulvous and brown, a narrow median line to just before the middle forks at right angles, and finally slightly reflexed, black, a wedge-shaped mark from the apex back to this fork, the lateral margins and basal angles ivory white. The apical wedge is black-margined, and the lateral margins have a few slender wavy lines of black extending into

them. Pronotum cinereous or brownish, sprinkled with light dots, and crossed by three transverse light bands, the anterior one broad and equidistant from the median one and margin, the posterior one marginal. Scutellum with the anterior half cinereous brownish, and the posterior half lighter. Elytra ivory white, closely dotted with brownish fuscous, omitting three irregular bands of light, the anterior one broad and marked with a few reticulated lines, the other two narrower and more irregular. A black dot at the apex of each claval and apical nervure. Face finely dotted with brownish fuscous, an ivory mark above.

Genitalia : female segment short, very slightly produced with a faint median notch.

Described from a single female from Biscayne Bay, Fla. Received from Mrs. Annie T. Slosson, in whose honour it is named. This and the following species belong in a group with *lippulus* in colour marking, but are quite distinct structurally.

Phlepsius fastuosus, n. sp.—Form and general appearance of *Slossoni* nearly, but much stouter, and with a shorter, broader vertex. Length, 7.5 mm.; width, 2.75 mm.

Vertex distinctly obtusely angular, the apex blunt and rounding, nearly twice longer on middle than against eye, where it is very narrow, disc flat, anterior margin thin, very slightly foliaceous, especially at apex. Front broad, slightly convex, lateral margin rounding to clypeus.

Colour : vertex brownish cinereous, a cross on the apex; the lateral margins and a few dots on the disc ivory white. Face irregularly dotted with brownish cinereous, omitting a light spot above. Pronotum brownish cinereous, dotted and irregularly irrorate with ivory white. Elytra milky white, irregularly marked with fine reticulations and small dots of brownish fuscous. The dots are mostly arranged in two bands, one rather narrow and definite across the posterior third of the clavus, and the other broader and less distinct, occupying the whole apex behind the clavus, the anterior band becoming black along the suture, and fading out before reaching the costa.

Genitalia : female segment rather long, posterior margin truncate, the median two-thirds angularly produced, elevated and slightly notched at the apex. A pair of black spots outside the apical lobes.

Described from a single female from U. S. Nat. Museum. Collection taken at Las Vegas, N. Mex., June 8th, by Barber and Schwarz.

Phlepsius nigrifrons, n. sp.—Form of *denudatus* nearly, but larger. Resembling *Vanduzei* in general appearance. but slightly shorter and stouter. Length, 7 mm ; width, 2.75 mm.

MANITOBA MICRO-LEPIDOPTERA.

BY W. D. KEARFOTT, MONTCLAIR, N. J.

(Continued from page 208.)

Exentera apriliana, Grote.—Aweme, IV, 30, to V, 21 ; Beulah. Thirteen specimens. This is a particularly interesting capture. Grote's description* is remarkably brief, and his generic description, occurring on the same page, is misleading on account of an error. He states : " Hind wings 7-veined, 5 wanting." I know of no Tortricid genus in which 5 is absent ; frequently 3 and 4 are coincident or stalked for their entire length, but even this is not the case in any one of these specimens; 3 and 4 are stalked from a quarter to a half. Prof C. H. Fernald kindly examined his type specimen, given him by Grote, and advises that in this specimen, which is a female, veins 3 and 4 are stalked for half their length, vein 5 present, bent strongly towards base, and arising close to origin of 3 + 4. It is exceedingly doubtful that Grote's genus will stand. The specimens are dark grayish-fuscous, almost immaculate, but with more or less obsolete-darker, narrower fascia from middle of costa to angle, and the basal area defined by an oblique line rising out of dorsum at inner quarter, but lost above middle of wing. Hind wings pale gray. Expanse 15. to 20. mm. Fore-wings narrow and outer margin rounded, not indented.

Proteopteryx columbia, Kearf.—Aweme, VII, 14. One specimen, agreeing with the type of the darkest form.

Epinotia incarnana, Haw.—Aweme, VII, 31. (Europe and California.)

Epinotia fasciolana, Clem.—Aweme, VI, 6 to 10 ; Beulah. (Maine to Penna.)

Epinotia liturana, Wlsm.—Cartwright. Type from California, not since recorded.

Epinotia imbridana, Fern.—Rounthwaite, July ; Aweme, VI, 9, to VIII, 12. This has been a MS. name for many years. Dr. Fernald promises to have the description in print before this appears.

Epinotia pseudotsugana, Kearf.—Rounthwaite, Aug.

Epinotia lindana, Fern.—Rounthwaite, Aug. (Canada, Mass.)

Ancylis mediofasciana, Clem.—Aweme, VI, 6 ; Beulah, VIII, 15 ; Winnipeg. (No. Atlantic States.)

Ancylis nubeculana, Clem.—Rounthwaite, Aug. (No. Atlantic States.)

Ancylis laciniana, Zell.—Rounthwaite, June ; Aweme, VI, 16 to 25. (Type from Mass.)

*CAN. ENT., IX, 227, 1877.

Ancylis comptana, Froel.—Aweme, V, 21. Supposed to be the same as the European strawberry leaf-roller and pest.

Ancylis dubiana, Clem.—Rounthwaite, June. (Type from Virginia.)

Ancylis angulifasciana, Zell.—Rounthwaite, Aug.; Aweme, V, 21, to VI, 14. (Maine to Ohio.)

Ancylis plagosana, Clem.—Aweme, V, 21 to 29; Beulah. Described from specimens collected in Labrador, not recorded since; a most interesting new record.

Ancylis diminuatana, Kearf.—Aweme, V, 21; Winnipeg.

Enarmonia prunivora, Walsh.—Aweme, VII, 6. (Missouri to Minnesota.)

Enarmonia lautana, Clem.—Aweme, IV, 29, and V, 1. (Virginia and Texas.)

Enarmonia gallæsaliciana, Riley.—Aweme, VI, 6 and 25; Rounthwaite, June and August. (New York to Texas.)

Enarmonia nigricana, Steph.—Rounthwaite, June. This is the species, the larvæ of which are sometimes quite injurious to cultivated peas, common to Europe, and supposed to have been introduced into America.

Hemimene simulana, Clem.—Aweme, VII, 25. (Atlantic States.)

Acleris nivisellana, Wlsm.—Aweme, IV, 30, to V, 14. (Maine to California.)

Acleris simpliciana, Wlsm.—Aweme, VI, 10, and X, 12. (New Hampshire and Oregon.)

Acleris pulverosana, Walk.—Beulah, May and July. Type from Hudson's Bay, not since recorded.

Acleris hastiana, Linn.?—I have, not only from Manitoba, but from all parts of North America, several hundred specimens, representing the most diverse and bizarre varieties, that may finally find lodgment under this name. I have also a number of European specimens representing a number of varieties. I do not feel able, at this time, to pass judgment on the species, and the only way the question will ever be satisfactorily solved will be by extensive breeding and inbreeding. So far as I know, none of the species of this genus are borers in stems or roots, all leaf tyers and crumplers, hence for any one with the time and opportunity, extensive breeding operations are not difficult. Meyrick gives the European food-plant as "*Saliv*" (willow). I have bred several of the so-called varieties from huckleberry.

Epagoge sulfureana, Clem.—Beulah, VII, 15; Rounthwaite, July.

The very pale canary yellow form, with the oblique lines reduced to three or four red dots, hind wings pale fuscous. (Atlantic States.)

Cenopis reticulatana, Clem.—Aweme, VII, 27, to VIII, 12; Cartwright, VIII, 12 to 28; Rounthwaite, July. (Atlantic and Southern States.)

Cenopis Pettitana, Rob.—Cartwright, VII, 22, to VIII, 14. (Atlantic States.)

Sparganothis senecionana, Wlsm.—Cartwright, VIII, 8. (California and Oregon.)

Sparganothis irrorea, Rob.—Rounthwaite, July; Aweme, VII, 9. (Maine to Colorado.)

Sparganathis breviornatana, Clem.—Winnipeg. I have long series, both male and female, of this species, as well as *S. xanthoides*, Walk., and can see no reason for uniting them.

Sparganothis puritana, Rob.—Rounthwaite July. (No. Atlantic States.)

Sparganothis vocaridorsana, Kearf.—Aweme, VII, 10; Winnipeg; Rounthwaite, July.

Archips rosaceana, Harris.—Aweme, 16 males and no females, VII, 1, to VII, 27; Cartwright, both sexes; Rounthwaite, July. (Northern United States.)

Archips purpurana, Clem.—Aweme, VII, 27 to 27. (No. Atlantic States.)

Archips cerasivorana, Fitch.—Cartwright, VIII, 4, to IX, 8. (Northern U. S. and California.)

Archips semiferana, Walk.—Rounthwaite, July. (Atlantic States to Colorado.)

Archips fervidana, Clem.—Criddle, VIII, 3 and 12; Beulah, VII, 15, to VIII, 15. (No. Atlantic States.)

Archips fractivittana, Clem.—Winnipeg. One specimen, paler yellow than eastern examples, the oblique brown band almost obsolete, and represented only by a small dot on costa, a larger blotch at anal angle, and a medium size spot midway between them. (So. Atlantic States and Ohio.)

Archips afflictana, Walk.—Winnipeg, V, 17. (Northern States and California.)

Archips virescana, Clem.—Rounthwaite, July. (Common all over North America.)

Archips glaucana, Wlsm.—Aweme, VII, 22 to 31; Beulah, VII, 15. Described from So. Oregon, not since recorded.

Archips Clemensiana, Fern. Rounthwaite, Aug. (Maine to Wisconsin.)

Archips persicana, Fitch.—Rounthwaite, July; Aweme, VI, 25, to VII, 12; Cartwright, VII, 11. (North Atlantic States and Canada.)

Platynota sentana, Clem.—Rounthwaite, July; Aweme, VII, 2 to 12. (Maine to Texas.)

Pandemis Canadana, Kearf.—Aweme, VIII, 2 to 13; Cartwright, VIII, 5 to 14; West Manitoba.

Tortrix Alleniana, Fern.—Cartwright, VI, 28, to VIII, 4; Aweme, VII, 9 to 23; Rounthwaite, July.

Tortrix lata, Rob.—Aweme, VII, 15, to VIII, 15; Winnipeg; Rounthwaite, June. Since writing the note, which appeared on page 93, *ante*, on *T. pallorana*, Rob., I have had the opportunity of examining specimens of both these species, as identified by Prof. Fernald, and while I am not convinced that there is more than one species, would, for the present, place those from Aweme, as well as those collected by Mr. Willing, under *lata*. The coloration of both are of much the same shades, and individual variation connect the two series, and the only good difference is that the fore wings of *lata* are broader in proportion to their length than *pallorana*; the termen of the latter is more oblique.

Tortrix albicomana, Clem.—Rounthwaite, July, the intermediate yellow form.

Tortrix quercifoliana, Fitch.—Aweme, VII, 9 to 26. (New York to Texas.)

Tortrix peritana, Clem.—Aweme, VII, 21 to 28. (Atlantic States.)

Tortrix conflictana, Walk.—Aweme, VI, 18, Cartwright. (No. Atlantic States.)

Tortrix horariana, Wlsm.—Winnipeg. Type from Oregon, and not since recorded.

Eulia quadrifasciana, Fern.—Cartwright. (No. Atlantic States.)

Eulia triferana, Walk. Aweme, VI, 16; Beulah. (Atlantic States.)

Phalonia vitellinana, Zell.—Rounthwaite, July; Aweme, VI, 14 to 25; Cartwright. (Maine to Mass.)

Phalonia angustana, Clem. (*promptana*, Rob.)—Beulah, VIII., 15. (Penna. and Texas.)

Phalonia angulatana, Rob.—Rounthwaite, June; Aweme, VII, 29; Winnipeg, VI, 18. (Penna. and Texas.)

Phalonia Smeathmanniana, Fab.?—Rounthwaite, June. Name subject to correction. (Europe, Maine and California.)

Phalonia bunteana, Rob.—Rounthwaite, July. (Atlantic States.)

Phalonia œnotherana, Riley.—Rounthwaite, Aug.; Aweme, VI, 8, VIII, 3, and X, 13. (Atlantic States.)

Hysterosia inopiana, Haw.—Rounthwaite, June and July; Aweme, VII, 2; Beulah, VIII, 15; Cartwright. (Europe and Northern United States.)

(To be continued.)

MANITOBA MICRO-LEPIDOPTERA.

BY W. D. KEARFOTT, MONTCLAIR, N. J.

(Continued from page 256.)

PYRALIDINA.

Diastictis argyralis, Hbn.—Beulah, IX, 14.

Nomophila noctuella, Schiff.—Cartwright.

Loxostege chortalis, Grt.—Aweme, VI, 6, to VI, 19; Souris.

Loxostege sticticalis, Linn.—Aweme, VII, 1; Souris; Wattsview.

Diasemia plumbosignalis, Fern.—Aweme, VII, 21 to 27; Cartwright.

Perispasta cæculalis, Zell.—Cartwright; Aweme, VI, 16 to 25.

Phlyctænia ferrugalis, Hbn.—Cartwright.

Phlyctænia itysalis, Walk.—Cartwright, VII, 18.

Phlyctænia tertialis, Gn.—Aweme, VI, 9 to 25; Cartwright.

Pyrausta fodinalis, Led.—Aweme, VII, 7 to 28; Souris.

Pyrausta unifascialis, Pack.—Beulah, VII, 15.

Pyrausta submedialis, Grt.—Rounthwaite, July.

Pyrausta perrubralis, Pack.—Aweme, VII, 28 and 29; Beulah, VII, 15; Rounthwaite, July.

Pyrausta ochosalis, Dyar.—Aweme, VI, 16, to VII, 2; Beulah; Cartwright, VI, 9.

Pyrausta signatalis, Walk.—Rounthwaite, June.

Pyrausta nicalis, Grt.—Aweme, VI, 13, to VIII, 15; Cartwright, VIII, 12.

Nymphula allioneali, Walk.—Rounthwaite, July.

Nymphula maculalis, Clem.—Cartwright.

Nymphula badiusalis, Walk.—Cartwright.

Schœnobius sordidillus, Zinck.—Rounthwaite, July.

Schœnobius unipunctellus, Rob.—Cartwright.

Schœnobius mellinellus, Clem., and var. *albicostellus*, Fern.—Cartwright, VII, 6.

Schœnobius Clemensellus, Rob.—Cartwright.

Crambus perlellus, Scop.—Cartwright.

Crambus pascuellus, Linn.—Rounthwaite, June.

Crambus coloradellus, Fern.—Aweme, VII, 22; Beulah, VII, 15.

Crambus murellus, Dyar.—Rounthwaite, July.

Crambus mutabilis, Clem.—Cartwright.

Crambus caliginosellus, Clem.—Cartwright.

Crambus luteolellus, Clem.—Beulah, VIII, 15.

Crambus præfectellus, Zinck.—Cartwright.

Crambus trisectus, Walk.—Beulah, VIII, 15.

Thaumatopsis nortella, Kearf.—Rounthwaite, June.

Chilo comptulatalis, Hulst.—Cartwright; Rounthwaite, July.

Diatræa idalis, Fern.—Cartwright.

Argyria auratella, Clem.—Aweme, VII, 31.

Tioga aplastella, Hulst.—Aweme, VI, 31.

Wanda baptisiella, Fern.—Rounthwaite, July.

Myelois obnupsella, Hulst.—Aweme, VI, 10.

Myelois corniella, Rag.—Aweme, VIII, 14 and 16.

Acrobasis caryæ, Grt.—Cartwright.

Mineola tricolorella, Grt.—Cartwright.

Ambesa lætella, Grt.—Cartwright.

Meroptera pravella, Grt.—Cartwright.

Salebria basilaris, Zell.—Rounthwaite, July; Aweme, VI, 16 and 18.

Salebria carneella, Hulst.—Aweme, VI, 16 and 18.

Myrlæa delassalis, Hulst.—Cartwright, VII, 10.

Laodamia fusca, Haw.—Aweme, VII, 22; Rounthwaite, June.

Epischnia albiplagiatella, Pack.—Beulah, VII, 14.

Epischnia Boisduvaliella, Gn.—Beulah, VIII, 15.

Megasis atrella, Hulst.—Cartwright; Rounthwaite, May.

Sarata perfuscalis, Hulst.—Beulah, V, 18.

Hulstia undulatella, Clem.—Rounthwaite, July; Cartwright, VIII, 13.

Homœosoma uncanale, Hulst.—Aweme, VI, 29; Cartwright.

Peoria approximella, Walk.—Aweme, VI, 16, to VI, 23; Beulah, VII, 15, to VIII, 15; Rounthwaite, July.

Oxyptilus tenuidactylus, Fitch.—Rounthwaite, July.

Platyptilia cosmodactyla, Hbn.—Rounthwaite, May.

Platyptilia percnodactyla, Wlsm.—Aweme, X, 2.

Platyptilia albidorsella, Wlsm.—Rounthwaite, May.

Platyptilia petrodactyla, Walk.—Rounthwaite, July.

Alucita Belfragei, Fish.—Rounthwaite, July.

Alucita cinerascens, Wlsm.—Rounthwaite, July.

Pterophorus homodactylus, Walk.—Rounthwaite, July.

Pterophorus Brucei, Fern.—Aweme, VI, 16, to VIII, 4; Beulah, VII, 15, to VIII, 15.

Pterophorus sulphureodactylus, Pack.—Rounthwaite, July.

Pterophorus paleaceus, Zell.—Aweme, VI, 28.

Pterophorus Baroni, Fish.—Rounthwaite, July; Aweme, VIII, 3.

Orneodes hexadactyla, Linn.—Aweme, V, 29.

TINEINA.

Harpipteryx canariella, Wlsm.—Rounthwaite, July; Cartwright; Aweme, VII, 31.

Harpipteryx frustella, Wlsm.—Rounthwaite, July; Cartwright.

Trachoma instabilella, Wlsm.—Rounthwaite, April.

Plutella maculipennis, Curt.—Rounthwaite, Sept.; Aweme, V, 25–28.

Telphusa quinquecristatella, Cham.—Aweme, VI, 6.

Aristotelia fungivorella, Clem.—Rounthwaite, July.

Recurvaria quercivorella, Cham.—Aweme, IV, 21, to V, 31.

Recurvaria obliquestrigella, Cham.—Aweme, V, 1 to 28.

Gnorimoschema gallæasteriella, Kell.—Rounthwaite, July; Beulah, VIII, 15; Aweme, X, 23.

Aproærema nigratomella, Clem.—Aweme, VI, 25.

Anacampsis tristrigella, Wlsm.—Rounthwaite, Aug.

Anacampsis niveopulvella, Cham.—Aweme, VII, 23 to 31.

Gelechia lugubrella, Fabr.—Aweme, VI, 7 to 14, VII, 31.

Gelechia dentella, Busck.—Aweme, VI, 6 to 25.

Gelechia grisella, Cham.—Aweme, IV, 18–V, 1–VI, 8–VII, 31 and X, 22. Agrees with Chambers' brief description, *Ante* IV, 171, 1872. Mr. Busck, in his revision of the Gelechiid family, places this species among those of which the types are missing, and no authentic examples are in existence. The specimens agree exactly in venation and structure with Busck's definition of the genus *Gelechia*. The species should follow *discoocellella*, Chamb., in the list.

Gelechia variabilis, Busck.—Rounthwaite, July; Beulah, VIII, 15.

Gelechia ornatifimbriella, Clem.—Rounthwaite, July; Aweme, VI, 16, to VII, 9.

Gelechia nigrimaculella, Busck.—Rounthwaite, Aug.; Aweme, VI, 6 to 16.

Gelechia pseudoacaciella, Cham.—Beulah.

Gelechia mediofuscella, Clem.—Aweme, IV, 8, to VI, 8.

Trichotaphe flavocostella, Clem.—Cartwright.

Trichotaphe purpureofusca, Wlsm.—Rounthwaite, July.

Trichotaphe setosella, Clem.—Rounthwaite, Aug.; Aweme, VI, 8.

Ypsolophus ligulellus, Hbn.—Rounthwaite, Sept.; Aweme, V, 23 to VI, 3, and X, 13.

Depressaria arnicella, Wlsm.—Cartwright; Aweme, IV, 24.

Depressaria argillacea, Wlsm.—Aweme, IV, 14, to V, 2.

Depressaria novimundi, Wlsm.—Aweme, VI, 27.

Depressaria psoraliella, Wlsm.—Rounthwaite, Aug.

Depressaria sabulella, Wlsm.—Beulah, VI, 15.

Depressaria Canadensis, Busck.—Rounthwaite, Aug.; Cartwright, IV, 11 to 17, and X, 11.

Semioscopsis aurorella, Dyar.—Aweme, IV, 16. One specimen identical with "Topotype" from Mr. Merrick.

Semioscopsis Merriccella, Dyar.—Aweme, V, 2 to 16. Two specimens very close to Dyar's type.

Semioscopsis inornata, Wlsm.—Rounthwaite, April; Cartwright.

Ethmia fuscipedella, Wlsm.—Rounthwaite, June; Cartwright.

Borkhausenia pseudospretella, Staint.—Aweme, V, 16 to 31; Cartwright, X, 30; Beulah.

Holcocera modestella, Clem.—Rounthwaite, July; Aweme, VI, 16 to 25.

Scythris impositella, Zell.—Rounthwaite, July.

Walshia amorphella, Clem.—Rounthwaite, July; Beulah, VII, 15.

Gracilaria elongella, Linn.—Aweme, V, 10 to 15.

Gracilaria stigmatella, Fabr.—Aweme, V, 27; Cartwright, XI, 1.

Argyresthia andereggiella, Dup.—Rounthwaite, July; Aweme, VII, 31.

Tineola bisselliella, Hum.—Aweme, IV, 19.

Monopis biflavimaculella, Clem.—Rounthwaite, Aug.; Cartwright; Aweme, V, 29, to VI, 16.

Monopis monachella, Hbn.—Cartwright; Aweme, VI, 16.

Amydrya effrenatella, Clem.—Cartwright.

Adela purpura, Walk.—Aweme, IV, 25, to V, 20.

I have between thirty and forty additional species of *Tineina*, which I hope to be able to work up and record in a supplementary article early next year. Owing to space limitations, it has been thought best to publish the new species of the *Tortricidæ* in the proceedings of the U. S. Natl. Museum. Due notice will be given when this appears, so that copies may readily be obtained by any one interested, either from the Museum direct or from me.

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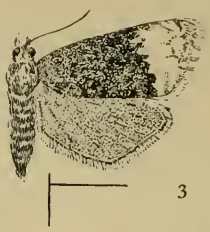
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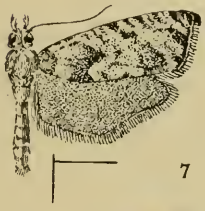
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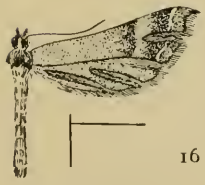
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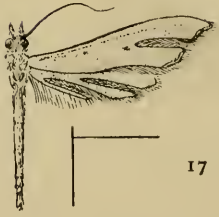
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E.L.Beutenmuller

New Species of Microlepidoptera.

59.57.82(75.6)

Article VIII.—MICROLEPIDOPTERA FROM THE BLACK MOUNTAIN REGION OF NORTH CAROLINA, WITH DESCRIPTIONS OF NEW SPECIES.

By W. D. Kearfott.

Plate VIII.

The material forming the subject of this paper was collected in the Black Mountain region, Buncombe Co., North Carolina, by Mr. Wm. Beutenmüller, during the several expeditions he has made to this interesting region under the auspices of the late Dean Hoffman, afterwards continued by his son Mr. Samuel V. Hoffman.

Altogether more than 140 species of microlepedoptera have already been determined, which number will be increased when all of the material is worked up. A complete list will appear in Mr. Beutenmüller's report; in the following pages reference is only made to the species supposedly new to science and to such others as have been bred or on which comparative notes are thought necessary.

The opportunity has been taken to figure five species, nos. 6, 7, 14, 16, and 18, not very well known, and which have not been figured before in this country.

I am indebted to Mrs. Beutenmüller for the easily recognized drawings, reproduced on the plate, and also for many of the larvæ which she took much interest in collecting. I have also to acknowledge the help of Dr. Dyar in identifying several Phycits and the assistance of Mr. Busck with several of the Gelechids.

Cotypes of all of the new species are deposited in the Collections of the American Museum of Natural History, and in my collection.

Pyrausta fissalis *Grote.*

Two specimens, one bred from larva on leaves of sassafras and one on goldenrod; received May 28 and June 1; in pupa June 8; issued June 21. Larva 28 to 30 mm. long, cylindrical, tapering very much to each end; grayish yellow, shining, tubercular plates large, shining, stained with brown around the edges. ia and ib joined in shape of figure 8. Head and P. T. shield pale brown. Pupated in slight web in crumpled leaves. Pupa very dark brown.

Pyrausta æglealis *Walker.*

One specimen, bred from larva on butternut, received June 15, issued July 16.

Larva shining, wet looking, semitransparent, pale yellow, brownish red dorsally on segments 3 to middle. Head small, triangular, pale brown, mottled with darker brown. P. T. shield same, with large dark brown patches on either side of dorsal line, on posterior edge, extending down to spiracles and forming a distinct collar. Dorsal tubercles on metathoracic segment on large brown plates. Lateral plates on segments 4, 5, and 6 also large and much darker than skin; other plates large but concolorous.

Folds leaf into large cell or cavity; frass not ejected, but compressed into a large moist mass.

Pyrausta signatalis *Walker?*

One specimen, Valley, June 26. All other specimens I have seen of Walker's species are a uniform shade of pink. This specimen is heavily shaded with reddish brown, with a broad ciliate ochreous band; the white transverse lines are, however, exactly like typical examples.

Acrobasis caryivorella *Ragonot.*

Four specimens bred from larvæ in cases between the leaves of alder; one received May 18 had already pupated; others received June 8, pupated a few days later. Moths issued June 22 to 29. Larva leathery, dark gray or greenish black. Head reddish-brown, P. T. shield ochreous brown, both head and shield very rough, their surface seeming to be covered with minute globules; on mesothoracic segment tubercle ib is on a large black and red chitinous plate. Larval case of grains of black frass and silk, serpentine in shape when of small diameter, but becoming straighter or cornucopia like when the larva is mature. Cocoon formed by spinning a rounded cover over the end of the case, or sometimes between two leaves. A large Hymenopterous parasite was bred from one larva.

Acrobasis kearfottella *Dyar.*

One specimen, bred from larva in case between leaves of hickory, received May 28.

Larva with skin of leathery brown texture. Case of grayish white silk with an occasional grain of grass, somewhat flattened, its small diameter serpentine, enlarging into a chamber 20 mm. long by 6 mm. wide by 4 mm. thick. Pupa in cocoon spun in the large outer end of the case.

Salebria contatella *Grote.*

Two specimens bred from larvæ on locust, received May 28 and June 6. Moths issued July 4 and 7. Mature larva agrees with description by Packard, p. 361, Fifth Report of Entomological Commission; but just before pupating the green becomes dull red. Cocoon, flattened oval, spun among debris at bottom of breeding jar.

Platyptilia carolina sp. nov.

Plate VIII, Fig. 17.

Expanse 22 to 25 mm.

Head, palpi, thorax and fore wing clay yellow. The fore wing is minutely dotted with a darker shade and the costa from inner third to outer fourth is dusted with blackish scales. There is a dark brown dot below costa, about a third from base, and another on lower lobe just within and below inner end of cleft; on the apex of the second lobe is a similar spot. There is a preciliate line of blackish brown on the termens of each lobe; a paler line separates another but less dark line from the long scales of the cilia, which are pale purplish fuscous. The hind wing is the same color as the fore wing but with a faint pinkish tinge, with brownish lines before the cilia, and a tiny black dot near outer end of cilia of third lobe. The body is shaded with brown posteriorly and on the sides, with a few whitish scales in the lateral tufts. Legs bleached straw color, dusted with brown.

I have a darker specimen, where the ground color is more thickly powdered with brown, and all of the dark lines and spots are accentuated. This specimen shows a tiny brown dot at the base of the first lobe, just above the dot on the second lobe; the hind margin cilia are also mixed with black scales on the outer half. Three specimens, "Valley," May 27 to June 26.

Exartema hippocastanum sp. nov.

Plate VIII, Fig. 2.

Expanse 21 to 22 mm.

Head olivaceous brown in which are mixed blackish brown scales, face cream color. Palpi cream color, outside of tuft on second joint stained with blackish fuscous on inner half of upper edge and the lower outer end of tuft; apical joint black with a tiny whitish dot on extreme apex. Antennæ fuscous, paler within. Thorax pinkish brown in front, gray in the middle divided by a black line, behind which are pink scales tipped with white; the tuft is of long fuscous scales tipped with pink, and with several white scales inserted; patagia fuscous and pink with lateral scales white. Abdomen, first joint white, others fuscous on upper side, white on sides, ochreous white beneath, tuft ochreous.

Fore wing with the usual *Exartema* scroll-work. The inner fascia transversely

across wing at inner fourth on costa to inner third on dorsal margin, divided into two parts by a narrow broken line of brown, and each side is divided by a leaden metallic blue line; its inner edge is deeply excavated for more than half its length in the middle, the outer edge sends an oblique spur through middle of cell and is indented a quarter above dorsum. The outer fascia begins on costa a little beyond middle in the form of two outwardly oblique costal dashes, which run into a flattened ovate patch over end of cell, which sends out two spurs at right angles to each other, one to the anal angle and one to dorsum at about two-thirds from base; the latter sends a short spur obliquely upward at about the middle of its length, which almost meets the outer spur of the inner fascia. This outer fascia, like the inner, is divided by a narrow brown line and each side subdivided by leaden blue. From the costa beyond this fascia are three geminate streaks, the two inner coalescing below and sending a spur down to middle of wing at outer margin; between this spur and the margin is a vertical geminate line. The basal area, within the inner fascia, contains a roughly triangular pale patch of the same shade and construction as the fasciæ, separating this from inner fascia is the ground color. Cilia fuscous, with a black spot at apex, and two pink streaks below apex, and two pink streaks above anal angle. The dark ground color, between the fasciæ is velvety black but more or less heavily overlaid with ochreous red scales, in some specimen the overlaying scales are rich indian red. The fasciæ and spots are pale shining pinkish white and fuscous, subdivided by shining leaden or steel blue. On the costa where these pale fasciæ and spots overlay it, the color is creamy white and there are six spots of this color. In the specimens of the indian red type, the thorax and head are several shades darker than described and frequently the white scales are missing.

Hind wing olivaceous brown, cilia white and patch above cell white; underside creamy white mottled with fuscous at apex and below costa. Underside of fore wing smoky fuscous with costal spots and spots in cilia repeated.

Six specimens, bred from larvæ feeding on buckeye, collected by Mrs. Beutenmüller, May 18

My notes on the larvæ are uncertain, as two species were in the same box but it is likely the following may be applied to this species. "About 16 mm. long, very intense green, head and P. T. shield small and jet black, slightly tapering to either end. Rolls and crumples the ends of the leaves often involving more than one leaf."

— **Exartema merrickanum** sp. nov.

Plate VIII, Fig. 1.

Expanse 18 to 20 mm.

Head yellowish-gray. Palpi whitish yellow, with a blotch of fuscous on outer end of second joint, and a tiny dot of the same color at base, outside; apical joint black. Thorax ashy gray mixed with olivaceous scales, posterior ends of patagia and thoracic tuft white. Abdomen white on segment beneath thoracic tuft; other segments fuscous, shining; anal tuft ochreous-brown.

Fore wing grayish white and olivaceous gray, with a dark shade from base to middle of costa and a large triangular patch of indian red in apex, enclosing an oval

black spot. The usual *Exartema* scroll-work is almost obliterated in this species. There are three olivaceous patches, one on fold at inner fourth, one below fold just beyond middle, and the third before anal angle; beyond the third is a patch of whitish shining scales with reddish and brown strigulæ, involving the anal angle and forming the inner boundary for the red apical triangle. There is a paler streak from inner fourth of dorsal margin to outer fourth of costa. The inner half of costa is dotted with cream and black; in the middle of costa is a quadrate spot of red and black scales; beyond this to apex the costal dashes are red and white, with a black dusting in the red; at the outer third the costal dashes send down leaden metallic lines which curve outward and run into the pale patch at anal angle, similar lines rise from the costal dots before apex, join together and run to middle of outer margin through the red patch and outside of the black spot. A small red and black spot on the middle of the wing at the end of cell. Cilia shining pink, with a nearly black patch at apex and three or four blackish scales between apex and anal angle.

Hind wing smoky brown, cilia white; underside gray white, with a streak of smoky brown below the cell and in the apex; cilia white. Underside of fore wing smoky brown, except along costa and termen which are creamy yellow.

Forty specimens: Black Mountains, N. Car., Valley, June 12; New Brighton, Pa., June 3 to Aug. 12, F. A. Merrick; Algonquin, Ill., July 8 to 13, Dr. Nason; Iowa City, Iowa, June 29, Prof. Wickham; Chicopee, Mass., F. Knab; Pittsburg, Pa., Henry Engel.

Nearest to *E. corylanum* Fern., but the latter is smaller and the prominent dark triangle in apex is absent.

Exartema versicoloranum *Clem.*

One specimen, bred from larva on black oak, issued June 5. Ten other specimens captured in valley between June 2 to 26.

Olethreutes nimbatana, var. **montanana** var. nov.

Plate VIII, Fig. 3.

One ♀ specimen, Mt. Graybeard, June 9. Larger and darker than *nimbatana*, the outer edge of the dark area nearly vertical, not curving inward as in *nimbatana*. The apex and extreme termen is much more heavily overlaid with dark scales and streaks.

Hind wing very dark smoky fuscous, cilia broadly paler. Expanse 20 mm.

Eucosma obfuscana *Riley.*

One specimen, Valley, June 11. I quite agree with Dr. Dyar in separating this from *E. scudderiana* Clem.

Epinotia ilicifoliana sp. nov.

Plate VIII, Figs. 8 and 9.

Expanse, ♂ and ♀, 13.5 to 15 mm.

Head dull gray, shaded with brown above eyes; palpi dark gray outside, lighter gray within; antennæ dull fuscous. Thorax dull gray, mixed with brown scales, with a purplish gleam, which is particularly strong on anterior and posterior ends of patagia. Abdomen silky fuscous above, faintly tinged with purple, below shining cinereous, darker on anal joints; legs shining cinereous, fore and middle tibiæ and tarsi annulated with brown.

Fore wing grayish cinereous, in a broad band from inner half of costa to dorsal margin, which is connected with large ocellic spot of the same shade. Dorsal patch to inner third on costa and half on dorsum, boundary line dentate; dull brown on dorsal half shading into cinereous brown above, and with a small grayish cinereous patch on dorsum. The costa is marked with about eleven purplish brown dots, between each a tiny dot of the same color, separated by shining gray; beyond the middle pale stripe these dots are large and conspicuous, the inner one (at middle of wing) being extended downward to end of cell, then joining a crescent shaped dash of the same color which sends a spur into the apex; above this crescent mark the costal spots are outlined below by yellow; the dark apical spot is the largest and is hook-shaped outwardly. Before the anal angle is a small triangular brownish spot, sometimes sending a yellowish line to the crescent above it. Ocellus not distinctly defined, but the gray ocellic region covers the outer third of wing below the crescent; it is slightly strigulated with vertical rows of brown scales, a curved one before the margin being most prominent. Cilia below the apical spot, dull fuscous outwardly, shining gray within.

Hind wing smoky brown, darker toward apex, cilia paler, preceded by a dark, then a light line. Underside of both wings brown with a faint grayish pubescence, costal spots of fore wing repeated.

Larva 12 mm. long, color dull yellow, green shining through in irregular blotches on dorsal and lateral regions. Head, prothoracic shield and thoracic legs black. A large polished black tubercule just in front of spiracle and a smaller one on base of leg, on joint 2. Anal shield green, not chitinous. Prothoracic shield divided by a paler dorsal line.

This species is quite variable, and ranges to a form in which the central gray fascia is almost obsolete, the dark area covering all of the costal and inner half of wing, the gray only appearing on the outer dorsal half, below the crescent to the boundary of the basal patch.

Bred from larvæ tying and crumpling the young leaves and terminal twigs of a species of *Ilex*, probably *verticillata* Linn., collected by Mrs. Beutenmüller on Mount Graybeard, No. Car., full grown May 20, in pupa May 27, and issued between June 10 and 20. Also bred by the writer from the same food-plant in Essex County Park, N. J., with about the same dates; found on one bush only, about six feet in diameter and the same height. About the middle of May for the past six years, this bush

is covered with the webs of these larvæ, as many as one hundred having been counted at one time, but a month later almost every vestige of their work had disappeared. I have only taken one specimen on the wing July 4.

Pupate in tight, dense cocoon spun in debris, or frequently in a small flap cut out of leaf and turned under. Breeding numbers K. 212, K. 465 and K. 543 placed temporarily under *Epinotia*; the structure does not fit with any of the Tortricid genera credited to North America.

Antennæ, ♂ and ♀, slightly dentate. Palpi with a flattened, triangular tuft of closely appressed scales on second joint, outer joint very short, obtuse not hidden. Long scales in circles above eyes, coming together above forming a slight crest between eyes and a larger posterior one on head. Thorax smooth. No tufts of raised scales on fore wing, and no costal fold in ♂. Fore wing slightly arched at base of costa and near apex, nearly straight between; apex rounded, deeply indented beneath apex, at ends of veins v and vi. Termen below evenly rounded into dorsal margin. Venation: 1 from middle of cell, 3 separated from 4, and bent downward to inner third, then upward until it approximates 4 at termen; the spaces between 4 + 5, 5 + 6, and 6 + 7 about equal; 7 from within upper angle of cell, 7 and 8 stalked for half their length, 7 to termen and 8 to costa.

Hind wing, 3 and 4 stalked for about one third, 5 approximate; 6 and 7 closely approximated at base.

Ancylis pulchellana *Clem.*

Plate VIII, Fig. 10.

One specimen, Valley, June 2. This species has always been in our lists under the genus *Proteopteryx*. The type is in the collection of the American Entomological Society, Philadelphia; it is very close to *A. laciniana* Zell. and *A. dubiana* Clem.

Enarmonia eclipsana *Zell.*

Four specimens, summit of Mt. Graybeard, May 26, and Valley, June 3. This species was omitted by Fernald in his original Catalogue of North American Tortricids, 1882, and apparently for the same reason has been omitted from all subsequent lists, notwithstanding a very beautiful figure of the species is given by Zeller in Verh. zool.-bot. Ges. Wien. plate IX, Fig. 29, 1875.

Hemimene nigromaculana sp. nov.

Plate VIII, Fig. 5.

Expanse 11 to 13 mm.

Head clay brown, crests above eyes olivaceous brown, under side of face whitish.

Palpi cream color, with outer half of tuft on second joint dull black; a small black dot at base of first joint, above. Antennæ fuscous, paler between joints. Thorax olivaceous, posterior end of patagia cream color. Abdomen olivaceous brown, anal tuft cream; legs creamy white, dusted with brown.

Fore wing: — Scales black at base, ochreous at tips, causing the ground color to appear as fine vertical strigulæ of ochreous on a black ground. From the middle of the dorsal margin four white lines converge towards the upper end and terminate at middle of wing, slanting outwardly to end of cell; the two middle lines are the most distinct, the outer ones being somewhat broken and not quite reaching the apex of the cluster. Between these and base, on dorsal margin, are two shorter white lines, inwardly oblique ending at fold, they are somewhat angulated with a tendency to turn outward at the upper end. On the costa before the middle are two pairs of white dashes, resting on the costal fold, from the outer pair a shade of blue continues to the apex of the cluster of white lines. Beyond the middle another pair of white costal dashes gives rise to a metallic blue line which curves outward and inward before the termen to the anal angle, enclosing at the end of the cell a rounded ochreous yellow spot divided by three horizontal black lines. On the outer fourth of costa are three single white dashes, the middle one sending off a blue metallic line which ends beneath the apex on the termen; a few blue scales outline each of the other two dots. On the extreme outer margin are five velvety black dots, the two upper ones being separated by a white dash, the outer end of which overlaps the cilia. There are two white dots on the lower side of the ochreous patch at end of cell, with a spur from the long blue metallic line enclosing the outer one. The male costal fold is nearly half the length of the wing. Cilia shining fuscous preceded by a paler line.

Hind wing: — Smoky brown, paler towards base, cilia fuscous preceded by a paler shade; underside the same with a whitish shade over the cell. Underside of fore wing shining bronze brown, dotted with white along costa, and the cilia cut with a white dash below the apex.

Two specimens: "Valley," June 1.

Lipoptycha albolineana sp. nov.

Plate VIII, Fig. 11.

Expanse 13.5 mm.

Head olivaceous brown, face and palpi light clay brown. Antennæ pale clay brown, darker between joints. Thorax dark gray; abdomen black above paler beneath, anal tuft clay brown; legs the same with tarsi powdered with blackish scales.

Fore wing: — Dingy brownish black, with several sordid white transverse lines. At inner third a geminate white line from costa to dorsum; just beyond middle a short oblique line goes to middle where it nearly joins a similar line from costa beyond; the two form a rough triangle enclosing a spot of ground color of the same shape, below the lower ends of these two lines is a vertical white line from dorsal margin, slightly outwardly oblique. On the outer fourth of costa are two shorter white lines, the outer one curving under the apex. From the anal angle a similar white line runs to lower end of cell. The black preciliate line is cut by four or five small whitish dashes.

Cilia gray, overlaid with smoky brown scales outwardly. Hind wing and underside of both, dark smoky brown, cilia paler, and the white costal spots repeated on fore wing.

Two specimens, "Half-way-place," June 8.

Archips rileyana *Grote.*

Many specimens, bred from larvæ, in communities, webbing together masses of the leaves of horse-chestnut. Received June 4; majority in pupa June 8; moths issued June 24 to 30. At least two hymenopterous parasites bred.

Tortrix albicomana *Clem.*

Two specimens bred from larvæ received May 28, mixed with the larvæ of *Telphusa latifasciella* Cham. From huckleberry.

Eulia juglandana *Fern.*

Five bred specimens. Two lots of larvæ received May 28 and June 8, on leaves of hickory; one larva on leaves of *Viburnum acerifolium* received June 15. The moths issued from the former June 18 to 23 and from the latter July 1.

The larvæ on both food plants were alike, 23 to 24 mm. long, cylindrical slightly tapering yellowish green, darker along dorsal line; head dirty yellow, marked with brown lines and dots on sides of lobes. P. T. and anal shields not chitinous.

Larvæ on hickory, live between two leaves, or between the two surfaces of one leaf folded over, using a considerable quantity of silk. Pupated in a fold of leaf in a rather dense, white silk cocoon.

Phalonia ednana sp. nov.

Plate VIII, Fig. 13.

Expanse, ♂ and ♀, 13 to 14 mm.

Antennæ golden brown, dark brown at base, biciliated in male. Head grayish ochreous, darker above eyes and mixed with dark scales in front. Palpi grayish ochreous within, with a line of dark brown scales on upper edge, outwardly the latter color, outer joint short, obtuse, black except extreme apex which is yellow. Tuft on second joint rather narrow, long, projecting slightly forward in points above and below third joint, but not concealing it. Thorax smooth, with flattened, slight, posterior tuft; dark brown, the tips of the posterior scales and scales of patagia

ochreous. Abdomen gray, with a purplish hue on middle segment, anal tuft ochreous. Legs pale gray, annulated with dark brown.

Fore wing: — Cinereous or yellowish gray, with a blackish spot covering basal area and another on costa at middle. The gray ground color is stained with pale yellowish ochreous and faintly tinged with reddish brown on apical third and below costal spot. The basal spot is outwardly rounded extending to inner fourth at middle, slightly indicated at lower median vein, it and the costal spot are very dark brown, on which are superimposed a few reddish brown scales. The costal spot is about the same size as basal spot, about one fourth length of wing on costa, extends down to middle of wing. On the dorsum are six or seven brownish fuscous spots, a faint strigulæ of fuscous ascends toward costa from each, those in the middle of the wing, running into the costal spot are most distinct, the middle one forming a prolongation of the lower apex of the spot and is edged with yellowish. In the apical part of wing is a long sinuate line, broadest at costa, extending down to below middle of wing and ending at termen, composed of fuscous and reddish brown scales. Cilia yellowish gray, interrupted by a few fuscous scales. Underside smoky brown, light cinereous on costa beneath the paler spaces of upper surface. Hind wing above dark gray, cilia a shade paler; beneath pale gray with brown vertical reticulations, cilia paler.

Described from about forty specimens from the following localities: Half-way place, Black Mountains, N. Car., June 29; Chinchilla, Pa., June 26 (A. E. Lister); Hazleton, Pa., July 12 to 28 (W. G. Dietz); Wyoming Co., Pa., 2300 elevation (Lister and Kearfott); Warren, Mass., July 12, (Kearfott); Center Harbor, N. H., No. 18.387 (H. G. Dyar); Ottawa, Can., July 10 (C. H. Young). Named in honor of Mrs. Edna L. Beutenmüller, who not only makes beautiful drawings of insects, but collected most of the larvæ, the notes of which appear in this paper.

In Wyoming Co., Pa., I found the species fairly abundant, flying close to the ground and usually alighting on twigs or the blackened stumps of a burnt over spruce forest; between the showers on a rainy day the majority of the specimens were found resting on these stumps. At Warren, Mass., they were found in a small woods of spruce and hardwood trees, flying close to the ground and usually alighting on twigs or on the ground.

The venation agrees with Meyrick's figure of *Phalonia*, excepting 3 and 4 of hind wings are connate, hence the species will later be transferred to a different genus.

Phalonia hoffmanana sp. nov.

Plate VIII, Fig. 4.

Expanse 12 mm.

Head and thorax blackish brown mixed with paler brown scales. Palpi pale brown with a few darker brown scales on outside of second joint and on third joint. Antenna fuscous, paler at base. Abdomen blackish brown, anal tuft ochreous. Legs cream colored dusted with brown.

Fore wing: — Olive and dark brown, with patches and lines of iridescent pinkish ochreous, raised scales. The basal patch, which extends to middle of costa and inner fourth of dorsal margin, is pale pinkish brown or pinkish ochreous, with a small rectangular brown spot on the costa at inner fourth, containing two small black dots, there are four small black dots on costa on each side of this brown spot in the pale basal area. Below the costa the pale color is lightly dotted with darker brown. Beyond this area, and occupying the middle third of the wing, is a large triangular dark brown area narrow on costa but extending to anal angle on dorsal margin. It contains numerous vertical black strigulæ and two small patches of pinkish ochreous scales on each side below the fold, and is margined on costa by black dots. Beyond it a narrow, angulated band of pinkish ochreous scales starts from costa at outer fourth and runs obliquely to anal angle; this line is interrupted on end of cell by a small patch of dark brown scales. Beyond this is a flattened lunate patch, extending from a little below costa to anal angle, of olivaceous brown, horizontally streaked with black. Between this and the apical margin is a larger lunate patch of rich brown, also lined with black; this involves the costa before the apex and extends down to middle of outer margin; the two lunate patches are separated by a broken line of iridescent scales, a line of the same outwardly defines the dark brown patch and is continued as an antimarginal line into the anal angle. The cilia is ochreous brown overlaid with fuscous and preceded by a broken line of black scales. All of the pinkish ochreous scales are shining, iridescent; those on the outer half of the wing are raised in clusters and lines. The most conspicuous tuft is in the middle of the wing at the end of the cell and another just before the anal angle below the fold.

Underside of fore wing, very dark blackish brown, with four whitish dots on outer half of costa; cilia ochreous brown, with three blackish patches and preceded by a blackish line inside of which is a narrow ochreous line.

Hind wing: — Rich smoky brown, cilia leaden metallic, shaded darker inwardly and preceded by a fine yellowish line. Underside blackish brown, with whitish vertical strigulæ.

Four specimens, Mount Graybeard, May 2; Valley, June 3 to 12.

Named in honor of Dean Hoffman, whose interest and love of science has made possible the discovery of this and many other species.

Phalonia obliquana sp. nov.

Plate VIII, Fig. 12.

Expanse 20 to 22 mm.

Head clay yellow, a shade darker on tufts behind the eyes. Palpi clay yellow, shaded with brown outwardly and with a white patch on the upper side of second segment. Thorax olivaceous yellow, patagia clay yellow and whitish at base. Abdomen and legs clay yellow, the latter speckled with brown, the dark color predominating on the first two pairs.

Fore wing: — Clay yellow, with rich cinnamon brown spots and lines. There is a large kidney shaped patch of brown in the middle of the wing, with the small end resting on the middle of the costa and the lower end, which is pointed, on the

middle of the wing, separated from the lower end by a line of shining whitish scales is a small oval shaped spot; these two spots form an oblique fascia from middle of costa towards the anal angle but do not reach below lower vein of cell; obliquely inwardly is a triangular brown spot on the dorsal margin, which is a continuation of the fascia but separated from the spots above by a streak of clay colored scales. There is a long streak of brown from base nearly to middle of wing, a shade of the same color from base along dorsal margin, and another shorter streak from base along costa. Between the middle and largest basal streak and the triangular dorsal patch is a diamond-shaped patch of brown, separated on both sides by shining white lines. There is a submarginal line of brown from anal angle to apex, unevenly indented on the outer side between the veins. Between this line and the middle fascia there is a patch of brown scales becoming paler towards costa, and on costa between outer fourth and apex is a small lunate spot enclosing a small dot of clay yellow. Another small dash of brown at end of vein eight. The pale spaces on upper fourth of wing on each side of middle fascia are shining whitish yellow scales, and on the costa are marked with three of four brown specks before and about half a dozen beyond the fascia. The lines separating the various brown spots and patches are usually of the shining whitish scales. Cilia clay yellow.

Hind wing shining cinereous, darker at apex and on outer ends of veins; cilia whitish except at apex, shaded with cinereous. Underside whitish, with a few scattered darker scales along the veins. Underside of fore wing coppery brown, clay yellow along costa and cilia.

Twelve specimens, Black Mountains, N. Car., "Valley"; Hastings, Fla.; Winnipeg, Manitoba, Hanham.

The Florida specimens are somewhat paler than the description; the dark brown being largely replaced by the ground color, but the outlines of the spots and fascia can be seen by the shining whitish boundary lines.

The apex of the fore wing is pointed, termen straight and oblique, all veins separate but three and four very close together at origin, seven to termen and its origin close to eight. Hind wing three and four rather widely separated, six and seven stalked.

Telphusa latifasciella *Cham.*

Eight specimens, bred from larvæ on huckleberry, webbing and tying together the tender young leaves. Received May 28, issued June 10 to 21.

Larva 10 to 12 mm. long, slender, yellowish white, green on dorsal line; head and P. T. shield pale yellow.

Gelechia unctulella *Zeller.*

Eleven specimens, bred from larvæ webbing together the leaves of common locust. Larvæ received May 28 and June 6, moths issued July 10 to 21.

Larva slender, tapering, pale green, with three darker stripes on each side, the width of the pale and dark stripes about equal. Head and P. T. shield dull yellow; anal shield not chitinous. Length 14 to 15 mm. Just before pupating the pale green becomes pinkish red and the darker stripes purplish red.

Pupa in a snug little cocoon between two or more leaves; shining chestnut brown, much broader across thorax than elsewhere, evenly tapering to anal end.

Gelechia vernella *Murtf.*

Fifteen specimens, bred from larvæ on leaves of black oak; received May 24, issued June 10 to 15.

Larva slender, tapering, pale green, with three darker stripes of equal width on each side. Head, P. T. shield and thoracic feet jet black; a broad, dull brown band on posterior half of second thoracic segment, extending its entire circumference. Anal shield not chitinous. Length about 12 mm. The green color becomes reddish when mature. Pupa shining, pale brown, in a web between the leaves. Some of the larvæ were badly infested with a minute dipterous parasite.

Depressaria pulvipennella *Clem.*

Two specimens, bred from larvæ webbing the young leaves of a species of *Eupatorium*; received June 13 and 25; moths issued July 9 and 15.

Depressaria robiniella *Pack.*

Two specimens, bred from larvæ webbing the leaves of common locust; received June 6 and 16; moths issued July 1 and 4.

Depressaria lythrella *Wlsm.*

Two bred specimens; larvæ received June 27, webbing the leaves of a low shrub (identity not known); moths issued July 20. Larva dull whitish green, no lines or stripes; pupating in debris in bottom of breeding jar in a slightly built cocoon.

In Walsingham's description of this species, he states that the larvæ are found in the leaves of *Lythrum alatum* (Illinois). These North Carolina specimens agree closely with Walsingham's description, except that they are a trifle larger,— 17 mm. instead of 15 mm.

Œcophora newmanella *Clem.*

Thirty-eight specimens, all flown, summit of Mt. Graybeard, May 26, and Valley May 28 to June 8. The variation in this long series is considerable, ranging from the form with prominent and well defined basal streaks to examples with the streaks almost obsolete, represented by a few ochreous scales only.

Antispila *Hübner.*

Synopsis of Species.

With white apical spot		1.
No apical spot		2.
1, Outer joints of antennæ white		*hydrangiæella* Cham.
Not white		*ampelopsiella* Cham.
2, With no dorsal or costal spot		*eugeniella* Busck.
With dorsal and costal spots		3.
3 Costal spot extended into an angulated fascia		*major* Kearf.
Costal spot of moderate size		4.
4, Fascia and spots golden hued		5.
Fascia and spots silvery white		*viticordifoliella* Clem.
5, Fore wings reddish coppery on outer half		*cornifoliella* Cham.
Fore wings not coppery		6.
6, Fore wings purple brown, without greenish reflection		*isabella* Clem.
Fore wings dark brown with greenish reflection		*nyssæfoliella* Clem.

Antispila major sp. nov.

Plate VIII, Fig. 15.

Alar expanse 9 mm.

Head, face, palpi, abdomen, and legs shining grayish bronze. Thorax shining bronze, not gray. Antennæ, basal and apical third brown, middle third silvery white.

Fore wing bronze brown, slightly shining. Spots and fascia pale golden, shining, the scales of the spots somewhat raised and occur as follows: Base broadly metallic, from costa to dorsum, outer edge inwardly curved. Fascia at inner third nearly straight, not wider on dorsal than costal margin, constricted at fold, and nearly separated into two spots of about equal size. Dorsal dash at outer third narrow, oblique outwardly to middle of wing, the metallic scales overspread the cilia, equalling in size and shape the spot on wing. Costal dash at apical fourth, obliquely inward to cell, thin angulated outward to anal angle, where it expands into a triangular blotch, roughly shaped like the letter S. Hind wings and cilia of both gray brown, not metallic.

Three specimens, Black Mountains, N. Car., "Valley," June 2, 8 and 10.

Gracilaria sassafrasella *Cham.*

Four specimens, bred from larvæ forming the characteristic cones on the leaves of common sassafras. Received June 9, issued June 22 to 29.

Larva 7.5 mm. long, slender, lemon yellow, head light brown, only three pairs of abdominal legs, or four pairs including anal claspers. Pupates under yellow silk cocoon, spun in a wrinkle of a leaf or in the angle of a box.

Epimartyria auricrinella *Wlsm.?*

Two specimens, Valley, June 1. Too badly rubbed to be absolutely certain of specific identity; one specimen has an ochreous head with wing expanse and general color scheme of *auricrinella*; the head of the other is entirely denuded.

EXPLANATION OF PLATE VIII.

Fig. 1. — *Exartema merrickanum* Kearfott.
2. — *Exartema hippocastanum* Kearfott.
3. — *Olethreutes nimbatana* var. *montanana* Kearfott.
4. — *Phalonia hoffmanana* Kearfott.
5. — *Hemimene nigromaculana* Kearfott.
6. — *Exartema versicoloranum* Clemens.
7. — *Thiodia signatana* Clemens.
8. — *Epinotia ilicifoliana* Kearfott.
9. — *Epinotia ilicifoliana* Kearfott.
10. — *Ancylis pulchellana* Clemens.
11. — *Lipoptycha albolineana* Kearfott.
12. — *Phalonia obliquana* Kearfott.
13. — *Phalonia cdnana* Kearfott.
14. — *Hemimene incarnana* Clemens.
15. — *Antispila major* Kearfott.
16. — *Platyptilia acanthodactyla* Hübner.
17. — *Platyptilia carolina* Kearfott.
18. — *Diasemia roseopennalis* Hulst.

TRANSACTIONS

OF THE

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VOLUME XXXIII.

NEW NORTH AMERICAN TORTRICIDÆ.

BY W. D. KEARFOTT.

Evetria monophylliana sp. nov.

Expanse 15–19 mm.

Head: whitish-gray, mixed with brown and reddish scales; palpi light brownish-fuscous; thorax whitish-gray, striped with shades of brown and bright red scales; antennæ light gray; abdomen missing on all four specimens; legs whitish, dusted with fuscous.

Forewing: white on the basal fourth and upper half from base to outer third, the ground color of the lower half, beyond the basal fourth and the apical third is a light pinkish-fawn or salmon. There are two transverse irregular bands of scattered fuscous-brown scales on basal fourth, with a few salmon dots in middle of the outer. There is a broad fuscous-brown fascia, more or less overlaid with salmon from middle of costa, through white ground color only, stopping at the salmon color. On each side of this the costa, in the white area, is evenly dotted with four or five fuscous-brown streaks. Above the salmon of the outer third the costa is narrowly white, on which are two groups of fuscous-brown scales, below each the salmon shade is more intense, of a coppery hue. Extreme edge of dorsum white, dotted with brown. Before a white preciliate line the termen is edged with bright red, slightly enlarged and mixed with a few blackish scales in the middle. Cilia inwardly red, outwardly pink, with a few scattered gray scales.

Hindwing: pale gray, cilia white, with a gray basal line; underside whitish dusted with fuscous in apex, cilia white.

Underside forewing: grayish fuscous, two large white costal spots before apex, cilia leaden, with whitish basal line.

Four specimens from collections U. S. Nat. Mus. Bearing labels "On *Pinus monophylla*;" Coso Valley, May 91, K;" "Argus Mts., May 91, K." In the Century Atlas both Coso Valley and Argus Mountains are shown in Kern Co., Cal.

Cotypes in U. S. Nat. Mus. and my collection.

Evetria sabiniana sp. nov.

Expanse 22–23 mm.

Head: whitish, tinged with salmon on sides; palpi white, lightly tinged with pink on sides; thorax white, mottled with salmon; antenna light salmon; abdomen white, anal tuft yellowish; legs salmon, thinly banded and dusted with white.

Forewing: salmon, with a broad white fascia across middle of wing and a narrower white fascia across wing at outer third. The white fasciæ are edged with shining scales, and a short line of the same cross wing before apex. These shining scales are white in the fasciæ and salmon elsewhere. The outer fascia is forked at costa, enclosing a small dot of salmon, between it and apex are two other obscure white costal dots. In the middle of wing at base is a streak of scales that are more of a pink shade than the salmon. Cilia white.

Hindwing: pale straw color, cilia white; underside the same, but darker below costa. Underside forewing ochreous yellow, dotted with white on costa, cilia white.

One specimen from collections U. S. Nat. Mus., bearing labels, "Sacramento Co., Cal.," "Augt. 9, '85," "3820," "43," "Larva on *Pinus sabiniana*," and a label in Walsingham's handwriting "*Steganoptica* n. sp. allied to *sinicolana* and *buolana* of Europe, left wings to W. 186."

One specimen from J. G. Grundel, Santa Clara, Cal., emerged from pine gum, June 20, 1904. This last specimen is darker than the first; the head, palpi, and thorax are shades of pinkish brown; the forewing is also more of a brownish pink, but the fasciæ, shining scales, and other marks are the same in both.

Cotypes in the U. S. Nat. Mus. and my collection.

Evetria zozana sp. nov.

Expanse 20 mm.

Head: pale fawn, mixed salmon, collar pale straw color; palpi very pale fawn within, speckled with light fuscous, externally reddish-salmon; antenna gray; thorax reddish-salmon in front and base of patagia, the balance gray, speckled with white; abdomen fuscous; legs speckled, cinereous gray and white.

Forewing: inner two-thirds white, heavily reticulated with blackish fuscous, somewhat concentrated in two darker fascia at inner fourth and middle, the latter is overlaid with dull ochreous scales on lower two-thirds. The outer third is reddish, divided by a whitish-pink fascia composed of a large spot below costa and another one above anal angle. The inner half of this reddish area is overlaid with dull ochreous on lower half; the outer portion, outlining termen, is intense red and forms a narrow fascia which is enlarged a third below costa and continuous to costa before apex as an ochreous streak. Beyond the red terminal band is a narrow white preciliate line. The cilia are pinkish, with a speckled white and gray line dividing this color below apex and superceding the pink at the anal angle.

Hindwing: smoky fuscous, darker at apex, cilia fuscous, with a darker line at base and a lighter line beyond.

Underside paler than upper. Underside forewing smoky fuscous, cilia paler, preceded by a white basal line, and with the ends of the pink scales overlapping on upper half.

One specimen, Placer Co., Cal., April 20; collected by Arthur H. Vachell.

Type in my collection.

Evetria colfaxiana sp. nov.

Expanse 22 mm.

Head and thorax whitish, mixed with black scales; palpi fawn, outer joint dark brown; antennæ gray; abdomen gray, annulated with dark fuscous; anal tuft pale fawn; legs pale fawn, dusted with fuscous.

Forewing: whitish gray. Base narrowly black, mottled with gray, succeeded by a whitish gray fascia, narrow on costa, broad on dorsum, followed by a broader dark fascia, black only on edges, overlaid in middle with gray, and above this a streak of ochreous; the outer line of this fascia is from costa at outer fourth, obliquely straight to fold, then concave to dorsum at inner third. Beyond this the ground color predominates, with a triangular spot on dorsum, at anal angle, sending a line of black scales from its upper end to costa at outer fourth, below costa this line connects with another shorter one which goes outside of ocellus. The broad whitish gray middle area is transversed by two, wide apart, lines of black scales, and lightly mottled with darker gray; through the middle of cell and below fold are horizontal streaks of yellowish. The ocellus is a flattened oval, long axis vertical, of whitish shining scales, enclosing a vertical line of shining ochreous. Beyond it the apex is coppery yellow. There are five black and four whitish spots on costa beyond middle, the inner two join together below, making a large quadrate dark shade, from the fourth dark spot descends the line of black scales above mentioned and from the fifth a similar black line divides the coppery shade. All of these dark spots are overlaid in the middle with coppery brown. Cilia pale gray, mottled with fuscous.

Hindwings: fuscous, cilia whitish; underside gray, dotted with dark fuscous on costa. Underside forewings dark fuscous, mottled with black; costal spots repeated.

One specimen, Colfax, Placer Co., Cal., July; collected by Arthur H. Vachell.

Evetria pasadenana sp. nov.

Expanse 15–19 mm.

Head: reddish-ochreous; palpi creamy-ochreous inside, dark reddish outside; antenna fuscous; thorax fuscous gray, patagia reddish at base and tipped with grayish-white; abdomen light brownish fuscous; legs grayish-white, banded and powdered with dark brown.

Forewing: gray, overlaid with reddish-brown scales, becoming more red in outer third. There are five transverse geminate paler gray lines, at about equal distance apart, the outer, before apex, reaches only to middle of wing; where each touches costa is a paler dot. The terminal line is white, sending dashes of same color into cilia, over each vein, below apex; before this white line is a

darker red shade from apex to anal angle, enlarged at the middle of the wing, it is continued as a red spot on dorsum before angle, above this in middle of wing is a clear red spot and a less distinct one above it on costa. Cilia gray, shaded with ferruginous at apex.

Hindwing: grayish-fuscous, cilia same, divided by a slightly darker line close to base; underside the same, but cilia whiter. Underside forewings smoky fuscous, reddish at apex.

Three specimens, Pasadena, Cal., April 14, W. G. Dietz; Alameda Co., Cal., March; Carmel-by-the-Sea, Monterey Co., Cal., A. H. Vachell.

Evetria burkeana sp. nov.

Expanse, ♂, 26–28 mm.

Head: with short tuft above eyes and between antennæ, face flattened, small, with thorax whitish-gray, thickly dotted with fuscous-brown; "griseous." Eyes jet black, with irregular lines of reddish-brown. Palpi, basal and second joint with moderate flattened tuft above and below, increasing slightly in width to end of second joint, same color as head; third joint obtusely pointed, about half length of second and not concealed by tufts of second, black, except base, which is paler. Antennæ, basal joint enlarged, whitish, with a streak of black in front; outer joints shortly ciliated below, pale fuscous, length about one-half. Abdomen dark fuscous above and below, scales overlapping posterior edge of each segment pale cinereous; a slight ridge of same color on each side, anal tufts same. Legs whitish, first and second pairs rather heavily clouded with dark brown on femora and tibiæ, and all tarsi heavily annulate with brown.

Forewing: white, with numerous transverse lines and fasciæ of gray-brown. A broad fascia from costa to dorsum; with its inner edge on costa at middle and outer edge at three-quarters; on dorsum, inner edge at two-thirds and outer edge at angle; the inner edge is much indented below upper vein of cell by a rounded prominence of white which nearly divides it; below this, above dorsum is a similar but less deep indentation; the outer edge of fascia is nearly straight, but much broken and indented. Before the fascia, to base, the surface is rather evenly strigulated with black and white, with the following more prominent markings; below middle on dorsum from inner third to inner sixth an irregular dark blotch, its outer edge with two rounded projections (which are parallel to corresponding indentation in fascia); between this blotch and fascia the color is more white than black, making an illy-defined whitish fascia before the dark one and at about equal width; on costa, before dark fascia, are four geminated white streaks, only the two outer ones (in whitish fascia) are well defined. Apical fifth of wing above ocellic space grayish-brown, with a narrow line continuing down to anal angle, between this and dark fascia is a narrow fascia of white, strigulated with dark lines from costa to outer margin above angle. The apex is dark, with a preciliate paler line; before apex the costa is marked with five prominent black dots, the outer two of which are on outer white fascia and inner three on middle dark fascia. Cilia blackish, interrupted by four white dots below apex and three larger white dots around angle. The blackish lines and fascia are, of the forewing, all more or less overlaid with gray, giving less the appearance of black and white than of grayish-brown and white.

Hindwing: pale, smoky fuscous, cilia paler, with a darker then a lighter line.

Underside forewing very dark smoky fuscous above lower median vein, white below it; costa and cilia dotted evenly with white,

Underside hindwing whitish, costal half shaded and reticulated with fuscous, cilia same, with fuscous dashes at ends of veins.

Two males, Hoquiam, Washington, bred by Mr. Burke, from *Picea sitchensis*, and bearing Division of Forestry record label "4009-9[1] and 4009-9[2] Hopk. U. S."

Cotypes U. S. Nat. Mus. and in my collection.

Polychrosis aruncana sp. nov.

Expanse 8.5–11 mm.

Head and palpi clay-yellow, latter tinged with brown on outside of tufts and former with brown behind. Thorax clay-brown, thickly dotted with darker brown, tuft leaden-black. Abdomen fuscous, anal tuft and legs clay-yellow, latter dusted and anulate with brown.

Forewing: inner third pale grayish-blue, divided by a brown band from costa, which reaches only to upper edge of cell. Costa within this space marked with three black spots, edged on both sides with white. The central fascia is narrowest on costa at middle, its inner edge goes vertically to dorsal margin, its outer edge obliquely to anal angle. The flattened oval brown patch in apical fourth sends two spurs to costa, another from outer edge to termen and which follows termen to angle, and coalesces with the central fascia at angle. These brown areas are overlaid with black on upper half of wing, and with three horizontal black lines in the flattened oval, beyond the end of cell with shining golden ochreous on lower half. There are four geminate white spots on costa between middle and apex, from each extends below costa pale metallic-blue streaks, the inner one extends across the brown fascia to dorsum, but is separated into three spots by the brown color. The apical and the one before it send oblique streaks to termen. A line of the same scales borders lower half of termen. Cilia leaden blue, with two tiny dashes of white on outer ends of the cilia below apex.

Hindwing: dark smoky brown, cilia white outwardly; underside grayish-brown.

Underside forewing smoky brown, costal spots repeated.

Eight specimens, from Prof. C. H. Chittenden, in charge of breeding experiments at the Department of Agriculture, Washington, D. C., bred from larvæ on *Aruncus aruncus*. Record number 9215. Cabin John's Bridge, Md., issued May 10 to 21, 1900.

Can be distinguished from any other species in this genus by the golden yellow patches.

Polychrosis yaracana sp. nov.

Expanse 9–10.5 mm.

Palpi and head pale creamy-brown, a shade darker on outside of tufts of former and collar of latter. Antennæ the same color, brown between joints. Thorax same shade of brown as collar, tufts cinnamon-brown. Abdomen whitish-gray, ringed with fuscous-brown between each segment, tuft gray, tinged with yellow and speckled above with brown. Legs white annulate and dusted with brown.

Forewing: a conspicuous black spot rests on costa between inner third and middle, and as a central fascia continues to fold, but becomes brown below the middle of the wing; its inner edge is slightly oblique to middle of wing, then vertical towards dorsum, but before reaching latter it turns and the outer margin runs obliquely upward in a spur to the middle of wing; the brown of this spur is shaded with black and above the spur is a white semi-circular patch containing on its lower side a small dot of fuscous. Between base and this dark fascia the ground color is white, with three, nearly equidistant black lines from costa to middle of wing; the middle one inwardly outlines a pale brown fascia extending nearly to dorsum; the inner fourth of dorsal margin, below the fold, is overlaid with brown and black scales; and a few scales of the same colors mark the base above. The white ground color, inside the middle fascia, is heavily overlaid with gray on the upper half of wing, and a patch of the same on lower half just before fascia; along the dorsum the white extends beyond the fascia, nearly to outer fourth rather heavily overlaid with gray at the outer end. Beyond the dark central fascia is a large olivaceous brown patch, extending from below costa to anal angle, rounded on its outer edge and nearly straight in its inner. A line of steely-gray scales separate it from a smaller triangular patch of the same color, in dorsum, within anal angle; the steely-gray line continues to costa at outer fourth, but becomes white above the middle of wing, where it joins another white line from costa, which runs obliquely outward to middle of termen, a similar white streak from costa, before apex, runs into this at middle of termen. The latter is interrupted by a streak of black scales below apex, and both of these white lines are outlined with gray scales. A similar but shorter white line separates the brown patch from termen above the angle. In apex is a lunate patch of brown overlaid with black. Cilia leaden-gray, interrupted below apex and at middle by a whitish dash, and few scales of whitish at angle.

Hindwing: white, tinged with smoky-brown in apex and before margin. Outer ends of cilia white, shaded with pale brown within. Underside the same.

Underside forewing fuscous, with eight geminate white spots on costa, cilia dark leaden-gray.

Five specimens, collected at Cincinnati, Ohio, by Miss Annette F. Braun, April 29th to May 14th.

This species is nearer to the European *P. botrana* than any of the American species I have seen.

Polychrosis magnoliana sp. nov.

Expanse, ♂, 11.5 mm.; ♀, 12 mm.

Head, palpi, antennæ and thorax cinnamon-brown, thorax streaked with leaden-black before the tuft, and the outer ends of tuft reddish-brown. Abdomen fuscous, anal segment leaden, tuft ochreous. Legs creamy-white, powdered with blackish-brown.

Forewing: inner half leaden-blue, divided by a narrow transverse line, which is bluish above and brown below middle. The middle fascia extends from costa to dorsum, its inner edge nearly straight and vertical; it is narrow to middle, then broadens outwardly to double the width, and from the widest outward point curves inwardly to dorsum, where it is less wide than at costa; black above,

brown below middle of wing, and outlined by ochreous-brown scales. Just above the outer limb of fascia and at about the end of the cell is a conspicuous round spot of bright ochreous yellow, from the upper edge of which an ochreous streak goes obliquely towards costa. Above this is a small black quadrate patch on costa with a streak of blue separating it from the middle fascia. A flattened oval patch of brown occupies the most of the apical fourth, with a smaller rounded patch of same color on dorsum before angle; these brown patches are outlined with shining leaden-gray scales. A similar lunate patch occupies the extreme apex, brown, dotted with black. On the outer fourth of costa are three geminate ochreous dots. Cilia mottled ochreous-brown, with a dash of leaden below apex and at middle.

Hindwing: very dark smoky brown, cilia whitish, paler within. Underside fuscous, with a yellowish streak above cell.

Underside forewing dark smoky brown, with costal dots repeated, cilia brown with two leaden dashes in termen, below apex, and leaden above apex and at angle angle.

Five specimens, bred from larvæ in the leaves of swamp magnolia. Bennings Station, District of Columbia, and Moorestown, N. J. Pupated August 1–7; issued August 10–20.

Nearest to *P. liriodendrana*, but can be at once separated by the conspicuous yellow dot at the end of cell, which can be easily seen without the use of a lens.

Polychrosis vernoniana sp. nov.

Expanse 9–11 mm.

Head: light brown, pale fawn in front; palpi pale fawn within, dark brown outside; antenna fuscous; thorax coppery brown, with a middle and two lateral black stripes, tuft ferruginous; abdomen fuscous; legs whitish, dusted with brown.

Forewing: pale bluish-gray. A large triangular fascia in middle of wing, the inner edge nearly a straight vertical line from costa to dorsum, the outer edge from costa curves outward and upward to end of cell, thence obliquely inward to dorsum. In the outer fourth is a large brown spot, touching anal angle below, and the costal edge above. At anal angle between these two is a small triangular brown spot. All of these three fasciæ and spots have horizontal black lines running through them. Above the outer limb of the fascia and the terminal spot, the space below costa is covered with ochreous brown scales mottled with darker brown. The costa is marked with fine line and dashes from base to apex. In the apex is an ocellated brown spot. The bluish, slightly shining ground color in this species is in well-defined bands; before the middle a narrow transverse band, between which and base is another of same width but more obscure. A narrow band surrounds the large terminal spot, except where the latter touches middle of termen, this band sends a spur into costa and into dorsal margin. Cilia blackish above, brown at angle angle, with a bluish reflection.

Hindwing: dark smoky brown, cilia white outwardly; underside a shade paler.

Underside forewing smoky fuscous, with eight or nine dull ochreous geminate spots on costa.

Twenty-one specimens, all bred from larvæ feeding in the flower heads and young seeds of *Vernonia noveboracensis*, Caldwell, N. J.; issued August 4th to 10th; District of Columbia, July 28th to August 7th; Dept. Agri., No. 3557, issued May 22d.

Polychrosis ambrosiana sp. nov.

Expanse 9–11 mm.

Head: pale fawn in front, darker over eyes and above; palpi very pale fawn, a shade darker on outside and apex; antenna brownish fuscous, becoming dark gray at outer end; thorax mottled, ochreous brown, black in centre; abdomen smoky black, anal tuft whitish above, cinereous beneath; legs very pale fawn, banded and dusted with fuscous.

Forewing: dull bluish gray, with a transverse brown band from middle of costa to anal angle, narrow and blackish brown on upper half, widest and lightest brown on lower half; an oblique line of the bluish ground color crosses this band on lower half of wing, cutting off a triangular spot on the dorsal margin. There is a narrow light brown fascia, mottled with darker brown close to base, and a finer darker line before this; a large patch of fawn-brown, mottled with darker brown covers apical part of wing, separated from the brown ocellate apical spot by a crescent-shape line of bluish-gray. This patch, by a darker brown shade, forms a large lunate spot in middle of wing before termen, which sends a long spur into termen at middle, another into anal angle, and in upper end is connected with the fawn-brown streak along costa. The costal edge is fawn-brown, with fine lines and dashes of darker brown and black. Cilia blackish-fuscous, becoming brown at anal angle.

Hindwing: smoky fuscous, cilia whitish.

Underside both wings dark silvery-gray, costa dotted with pale fawn.

Fifteen specimens, bred from larvæ feeding in the seeds of *Ambrosia trifidi*, from Cincinnati, Ohio, forwarded by Miss Annette F. Braun, and one specimen bred many years ago from the same seeds by Miss Mary E. Murtfeldt, at Kirkwood, Mo. Larvæ were full fed and pupating from Aug. 10th to 20th; moths issued Aug. 20th to Sept. 10th. There is a later brood which hibernate in the seeds as larvæ. I have one flown specimen from Miss Braun, captured May 14th.

Olethreutes gogana sp. nov.

Expanse 20 mm.

Head: dark fuscous; palpi dark fuscous, black outwardly, pale ochreous at base and underside of head; antenna dark fuscous; thorax black, patagia and posterior end streaked with reddish-brown; abdomen light fuscous, with long lateral tufts, anal tuft cinereous; legs cinereous dusted with black.

Forewing: dusky black, with obscure grayish-white shining fascia and spots. The most prominent is from inner fourth of costa to inner third of dorsum, broader on dorsal margin. There are two narrower bands from beyond middle of costa to dorsum of anal angle. There are three flattened spots under the costa

between the twin fasciæ and apex, and a streak from below the middle one to termen at middle, then to anal angle. In the apex is a large rounded spot of ochreous, all of the spots in apical third of wing contain ochreous scales; and a sprinkling of same over the balance of the wing. Cilia shining fuscous, preceded by an ochreous line.

Hindwing: smoky gray, cilia light gray; underside same. Underside hindwing a shade darker, costal spots repeated, and an ochreous preciliate line.

One ♂ specimen, Wellington, B. C., April 4th, collected by G. W. Taylor.

Olethreutes galaxana sp. nov.

Expanse 21 to 23 mm.

Head: ochreish-brown, mixed with black scales; palpi same shade of brown outside, paler inside, with a few scales at outer end of tuft, and apical joint black; antenna shining yellowish-gray; thorax black, thickly speckled with ochreish-brown, and tips of patagia same color; abdomen blackish-fuscous, posterior edge of each segment pale yellowish-white, anal tuft pale ochreous; legs fuscous black, thinly ringed and dusted with pale ochreous.

Forewing: pale ochreous-brown or light fawn, with basal patch, middle and outer fascia black, the dark areas outlined by shining steel-blue metallic scales.

The dark basal area is more or less overlaid with brown scales; it reaches to inner sixth on costa, is widest above middle of wing, is sharply indented below middle. The middle dark fascia is, from costa before middle, as a flattened ovate spot to below cell; to its inner, lower edge is joined a similar but smaller spot which completes the fascia to dorsal margin. The outer fascia begins at outer fourth of costa as a small spot on costa, enlarges immediately below costa, and, as a large, flattened ovate spot, extends nearly to termen above anal angle and fills more than half the area beyond cell. Below it, and separated only by the metallic line, is a rounded dark spot on dorsum before anal angle. The costa in the dark basal area is lightly speckled with brown, between this and middle fascia with three geminate brown and black dots, in the outer half with four geminate brown spots, becoming whitish on entering edge of costa. The four lines of metallic scales in outer half of wing begin at these germinate spots. A narrow apical area beyond the last metallic line is black, overlaid with brown. Cilia shining leaden.

Hindwing: Grayish-fuscous; cilia shining, lighter fuscous, with a darker line near base; underside, both wings, same as upper side of hindwing. Costal spots repeated.

Three specimens, Vernon, B. C., April 13th and May 18th, Victoria, B. C.

Olethreutes glitranana sp. nov.

Expanse 15 to 17 mm.

Head: pale fawn, mixed with black; palpi, pale fawn, shaded with black outside, apical joint blackish; antenna pale fawn; thorax blackish-fuscous, edged with pale fawn; abdomen black, each segment posteriorly edged with white; tuft light ochreous; legs light ochreous, banded and dusted with black.

Forewing: two distinct, narrow creamy-ochreous, clouded with pale brown fasciæ, the inner at inner third and outer at outer third on a ground color of black rather heavily covered with light reddish-brown scales, the latter thicker in api-

cal third. The inner pale fascia form two geminate spots on costa; from the inner a broken line of steel-blue metallic scales, starting on the inside edge of fascia, crosses it, and on lower half outlines the outer edge; from the outer geminate spot a short line of metallic bounds the outer edge of fascia. There are two similar geminate spots and metallic lines from outer pale fascia; the inner line is much broken, but in dots outlines the inner edge of fascia; the outer metallic line follows outer edge of fascia to middle, then goes nearly to anal angle, but does not connect with a small group of metallic scales at that point. There are two geminate costal spots before apex, from the inner a metallic line margins termen nearly to anal angle; from the outer a short metallic line defines a darker apical spot; between these lines is a streak or narrow fascia of reddish-brown. There is a blackish preciliate line preceded by an irregular mottled line. The cilia is shining leaden at apex, cream color below, with dashes of brownish-fuscous in middle of wing and outwardly edged with this color below middle.

Hindwing: smoky, dark brown; cilia cream-white with a fuscous basal line; underside the same, but somewhat mottled with pale fawn; underside forewing smoky, dark brown; costal dots repeated.

Ten specimens, Aweme, Manitoba, June 39th to July 5th, Norman Criddle; Regina, Assa., July 2d, T. N. Willing; Winnipeg, Man., A. W. Hanham.

Olethreutes coronana sp. nov.

Expanse 16 to 19 mm.

Head: pale fawn, mixed with a few black scales on top; palpi pale fawn, blackish on outer end of tuft and with a black dot above on outside of second and first joints; antenna whitish-fawn; thorax fawn in which black is mixed; ends of patagia paler fawn; abdomen blackish-fuscous, posteriorly each segment edged with whitish; anal tuft yellowish-ochreous, darker at base; legs dark cream, banded and powdered with blackish-brown.

Forewing: pale olivaceous brown or light fawn, mottled with black and crossed by a number of steely-blue metallic lines. The black scales are closer together forming a dark fascial shade across wing at middle; inner edge straight, outer edge rounded; its width at middle is half the width of wing. A similar but less distinct dark shade beyond end of cell, starting from the two middle of the four geminate costal spots on outer half; its inner edge slightly concave to dorsal margin, its outer edge sweeping around before termen. The paler fascia between these is narrower than the outer dark fascia, and is divided at its lower third, sending a branch to anal angle and one to outer fourth of dorsum, and enclosing in the fork a triangular darker spot. The metallic irregularly separates these lighter and darker areas. A short metallic line from costa before apex outlines a small brown spot. Cilia cream-white with a small spot of fuscous in apex, and similar dashes at ends of veins 3, 4, and 5.

Hindwing: cream-white, lightly dotted with brownish-fuscous around margin, and veins 6 and 7 overlaid with same color beyond the cell; cilia whitish with a darker basal line; underside the same with less brown scales. Underside forewing olivaceous brown, mottled with yellowish-white before termen and costal spots repeated in same color.

Three specimens, Aweme, Man., July 9th and 31st, Norman Criddle; Beulah, Man., Aug. 15th, A. J. Dennis.

Olethreutes rosaschreana sp. nov.

Expanse 12.5 to 14 mm.

Head: dark rose, tinged with ochreous behind, and the frontal scales tipped with black; palpi dark rose, ochreous within; antenna grayish-fuscous; thorax dark rose, ochreous in centre; abdomen silvery-fuscous; legs cream-white dusted with dark brown.

Forewing: above fold dark rose, below fold orange-ochreous, except at extreme base and at outer end, where the ochreous merges into the prevailing rose color. There is a shining patch of paler rose on upper third of wing between base and middle; the upper edge of this merges into ochreous on costa. There is a similar patch of paler shining rose scales in the ocellic area; it follows termen from lower third around angle to outer fifth of dorsum; its upper edge nearly reaches middle of wing, and sends a rounded process inward before curving downward and outward to dorsum; near its upper edge are a few metallic scales. Between this patch and the ochreous dorsal patch there is a blackish-rose shade along outer third of fold. On the costa between inner third and apex are five geminate, very oblique yellowish streaks, the inner is in the light rose shining patch; from the streak in middle of wing is a long streak of shining rose paralleling costa and curving gradually before apex and termen, ending in the latter below middle. This shining streak is bounded inwardly by a broader streak of dull rose. Between the shining streak and apical margin, including upper half of termen, the interspaces between veins dull ochreous, and the dull rose over the veins is outwardly lightly strigulated with whitish-yellow. Before the black preciliate line is a line of dull rose shaded with black over veins. Near the outer end of cell are two spots of leaden fuscous, the smaller near upper edge and larger near lower edge of cell. Cilia rose, becoming gray at anal angle and touched with blackish at end of each vein.

Hindwing: dull, smoky brown; cilia same, but shining, with a darker basal line; underside, both wings the same.

Six specimens, Florida, from Prof. Fernald's collection. Cotypes in his and my collection.

The wing coloration of this species is allied to *Malachitana* Lell.

Olethreutes ochromediana sp. nov.

Expanse 11.5 to 12 mm.

Head: mixed ochreous and black, paler ochreous in front and base of antenna; palpi pale ochreous, two black spots on outside of second joint; apical joint black; antenna grayish-fuscous; thorax ochreous, patagia and posterior tuft blackish-fuscous; abdomen grayish-fuscous, anal tuft pale yellow; legs creamy-white dusted with dark fuscous.

Forewing: basal area and apical third mottled black, ochreous and shining blue lines. The middle of the wing is covered by a broad ochreish fascia, commencing as a narrow spot on costa but swelling out below and covering half the dorsum. Its inner edge begins on costa at inner third, is nearly straight for a third the width of wing, then curves convexly to dorsum at inner fourth; the outer edge begins close beyond the inner edge, curves convexly to dorsum at outer fourth; it is dentate, sending out spurs at upper fourth, middle, and lower

third. Between the fascia and base is an ochreous costal spot that sends a line to dorsum, but is interrupted at fold. Beyond the fascia are several ochreous streaks, the inner connecting with an ochreous and black patch; the one from middle of wing sends a curving fascia under costa to anal angle before termen. On the outer third the ochreous spots merge together in a continuous streak below costa. The dark ground color is almost entirely overlaid or dotted with metallic blue. There are some black vertical lines from ocellus to above middle of wing. The ocellus is not clearly defined, consisting of an irregular line of steely-blue scales defined on each side by these black lines. Cilia pinkish-fuscous.

Hindwing: smoky fuscous, slightly paler at base, cilia whitish; underside both wings grayish-fuscous; forewing a shade darker with costal spots repeated on extreme edge.

Three specimens, Hazleton, Pa., June 4th and July 14th, Dr. Dietz; Hampton, N. H., July 25th, S. Albert Shaw.

Allied to and very much like *osmundana* Fern., but entirely lacks the shining whitish bands in the outer half of that species as well as its well-defined spot on dorsum before anal angle.

Olethreutes daeckeana sp. nov.

Expanse 17 to 19 mm.

Head: black, mixed with pink scales; palpi pale fawn, black outwardly and apically; antenna blackish-fuscous; thorax blue-black; patagia mottled, pale fuscous and pink; abdomen fuscous; legs cinereous, dusted and banded with black.

Forewing: mottled, shining, dull blue-black and pinkish-ochreous. There is a transverse fascia in middle of wing of velvety-black scales, changing to dull ochreous at dorsum; the inner edge is indented four times; the outer edge gives off three long spurs about equally separated. A smaller black spot is on fold at inner fourth; a disconnected black streak runs from it to base, and above it on costa is another. There is a lunate black spot before apex and a black line from anal angle to above middle of wing. The black spots are generally outwardly outlined with reddish-ochreous. The balance of the ground color is shining dull-blue, dotted with black and pinkish-ochreous. Before the middle the costa is marked with six short reddish-ochreous dashes; there are four larger wedge-shaped streaks of same color on outer half; the two outer join below costa and send a line paralleling termen to middle of wing; the outer ends of veins before termen are outlined with black. Cilia bluish-fuscous with a darker line at base.

Hindwing: coppery-brown; cilia fuscous with darker basal line; underside, both wings the same; forewing less coppery and more grayish-fuscous.

Ten specimens, bred from larvæ boring in the stalks and flowers of the pitcher plant, *Sarracenia purpurea*, at Toms River, N. J., and Brown's Mills Junction, N. J., issued July 4th to Aug. 4th, all collected and bred by Mr. E. Daecke, in whose honor the species is named.

This species belongs to the group in which are *hebesana* Walk. and *agilana* Clem.

Olethreutes wellingtoniana sp. nov.

Expanse 18 mm.

Head: fuscous, hoary-white on top; palpi cinereous, outer joint dark brown, antenna cinereous; thorax mottled white and fuscous: abdomen yellowish; legs ashy-white, shaded with dark brown.

Forewing: mottled, white, gray, dark fuscous and black. The darker scales form a fascia across wing beyond middle; the inner edge from costa at middle curving slightly inward to middle of wing; thence more or less distinctly to dorsum; the outer edge from costa at three-fifths from base, angles outwardly to middle of cell, then obliquely inward to dorsum before angle. It contains a whitish shade in outer angle, and is mottled with black above middle, with an occasional ferruginous scale. Before this is a white fascia, only clearly defined on upper half; before this is a darker shade, not definite enough to call a fascia, it contains four black dots in middle of wing, two above and two below fold.

The small basal area is slightly paler. Beyond the principal dark fascia, the apical fourth is white, with four indistinct large gray costal spots, the inner two sending a gray shade curving toward termen then to anal angle.

There is a row of seven or eight terminal black dots, the three upper ones the most distinct. Cilia grayish-fuscous, with a whitish basal line.

Hindwing: cinereous-gray, cilia same; underside same shade but mottled with fuscous.

Underside forewing dark cinereous gray, costal spots repeated and line at terminal dots faintly repeated.

Two specimens, Wellington, Br. Col., May 19th, collected by Rev. George W. Taylor.

Olethreutes separatana sp. nov.

Expanse 12–15 mm.

Head: black; palpi black, fuscous within; antenna fuscous; thorax black, patagia pale lilac, with a black spot near base, posterior tuft bronzy-black; thorax, inner half, cinereous, outer half fuscous; legs grayish-white, banded and dusted with dark brown.

Forewing: outer two-fifths pale lilaceous-white, with four pale fuscous costal streaks and a shade of the same color before termen. A small black dot in middle of wing at end of cell; and a gray shade at anal angle. The inner three-fifths of wing is mottled black and gray, with a lilaceous patch from base to inner fourth on upper half of wing which connects by a few pale scales with a geminate quadrate spot between dorsum and fold before middle of wing. Cilia pinkish-fuscous, paler at angle.

Hindwing: smoky brown, cilia whitish; underside yellowish-gray, mottled with fuscous

Underside forewing: smoky fuscous, costal dots repeated.

Nine specimens, Essex Co., N. J., June 14th to 15th; New Brighton, Pa., June 2d and Aug. 20th, J. A. Merrick; Washington Co., Ark., Aug., A. J. Brown; Cincinnati, Ohio, June 17th, Miss Braun.

This species has been wrongly identified as *O. dimidiana* Sodoff. in almost all collections. *Dimidiana* is a darker species. It has a spot on costa at inner third, and the blackish area comes much closer to anal angle. It does not have the pale shade from base and the pale spot on dorsum before middle. Have never seen a North American specimen at all like the European *dimidiana*, and do not believe it occurs on this continent.

Olethreutes mana sp. nov.

Expanse 18 mm.

Head: ferruginous and black; palpi pale cinereous, outer end of tuft and apical joint blackish; antenna brownish-fuscous, blackish at base; thorax brown, posterior tuft black; abdomen fuscous; legs yellowish-white, banded and dusted with blackish-brown.

Forewing: inner three-fifths yellowish-brown, vertically strigulated with wavy darker brown and fuscous, which on the costa form darker dots; below the fold on the inner half is a whitish shade, with a cluster of long blackish scales on the dorsum before it. The outer two-fifths is creamy-white, with a shade of fine fuscous dots before apex, divided by a line of raised shining cream-white scales; there is a small patch of leaden scales above middle of wing at end of cell, surrounded by a ring of white raised scales, with a small tuft of the same above and below, the latter running to anal angle and continued along termen to middle. There is a leaden spot in middle of wing near end of cell and another below it on the dorsum, both in the dark area. The dark and whitish areas are rather sharply defined, the division being straight from outer third of costa to middle of dorsum. There are four blackish dots on costa in white area, and black scales are over each vein forming a terminal row, at the apex the black scales are more frequent, Cilia dirty white, becoming fuscous and black at apex.

Hindwing: smoky brown, cilia white, with a dark basal line; underside creamy-white, mottled and outward strigulated with brownish fuscous.

Underside forewing: smoky fuscous, dotted with creamy-white along costa and an preapical line of the same shade.

Two specimens, Black Jack Springs, Texas, Dr. Barnes; Victoria, Texas, April 10th, E. A. Schwartz.

Should be placed in list between *nimbatana* Clem. and *separatana* Kearf.

Cotypes in U. S. Nat. Mus. and my collection.

Olethreutes rubipunctana sp. nov.

Expanse 17–22 mm.

Head: light brown on top, black in front and over eyes; palpi light brown inside, smoky black outside, apical joint black, tipped with light brown; thorax centre black, pale fawn at base of tuft, tuft saffron-red, patagia fuscous at base becoming pale fawn outwardly; abdomen grayish-fuscous, tuft pale ochreous; legs yellowish-white, banded and dusted with dark brown.

Forewing: the outer third pinkish-white, inner two-thirds mottled with shades of brown and black. In the middle of wing is a large black patch, its upper edge

touching costa, and lower nearly to middle of wing, about as wide as deep, two streaks of brown scales divide it in some specimens. There is a shade of dull slate-blue before and below it, and a few scales of the color on its outer edge beneath costa. Between the slate-blue streak and dorsal margin the fascia is continued of light brown mixed with black. Below the inner half of slate-blue scales is a pinkish-white patch on dorsum, and above it a light mottled brown patch to costa, the three forming a paler fascia. Inside of this pale fascia the basal area is mottled shades of brown, shaded outwardly with black below costa and below middle. On the dorsum at base is a patch of slate-blue. In the outer third white area there is a conspicuous spot above dorsum, inside the ocellic area, of two or three short vertical lines of brown and black, and a more or less distinct single line running up to middle of wing. There is a broken narrow band of black and brown scales from costal spot before apex to termen below middle, crossed on veins 6 and 7 by bluish lines; in some specimens the bluish vein lines, with the black interspaces at their outer ends closely resemble the rim and spokes of a fifteen degree wheel segment. On the costa, in the whitish area, are four large saffron spots; the apical spot is black, edged with saffron. Ciling shining dark blue, dusky at apex, whitish at anal angle, a fine whitish basal line preceded by black terminal line.

Hindwing: light coppery-brown, cilia whitish, underside gray, with a coppery deflection.

Underside forewing: smoky black, with large paler mottlings on costa and outer end.

Six specimens, Placer Co., Cal., May 1st, Vachell; Cisco, Cal., June 1st, Vachell; San Luis Obispo, Cal., March, Vachell; Colorado, No. 2693, Gillette.

Cotypes in U. S. Nat. Mus. and my collection.

Olethreutes removana sp. nov.

Expanse 17–21 mm.

Head, palpi and antenna grayish-brown; thorax gray, tips of tuft and patagia pink; thorax, golden-gray tufts of long scales, on side whitish, anal tuft golden-brown; legs cream-white, banded and dusted with dark brown.

Forewing: dark gray, mottled with a darker shade. The color of wing is nearly a uniform gray, with all marking obsolete, with the eye can be seen a faintly darker line from middle of costa to anal angle; with a lens there is a darker shade at inner fourth of costa forming an inner fascia, entirely obsolete below middle of wing, and along costa slightly darker costal spots separated by a shade lighter gray. In the middle of wing before termen is a darker shade. Cilia concolorous.

Hindwing: light smoky brown, cilia whitish, darker at apex, underside whitish-brown, darker along termen and mottled below costa.

Underside forewing: dark fuscous-gray, with large whitish geminate costal spots.

Four specimens. New Brighton, Pa., Aug. 21st, F. A. Merrick; Algonquin, Ill., June 25th, Dr. Nason; Aweme, Man., Aug. 16th, Norman Criddle; Chicago, Ill., June, J. H. Reading.

Olethreutes provana sp. nov.

Expanse 22 mm.

Head and thorax yellowish-white, posterior tuft black; palpi light brown; shaded with black on outside; antennæ light fuscous; abdomen yellowish brown, legs yellowish-white, dusted with dark brown.

Forewing: white, with an inner and middle dark fascia, the beginning of an outer fascia and two dark spots on costa between latter and apex.

The fasciæ and spots are white, dotted with black and edged with black. The inner fascia is very close to base and encloses a small basal patch of white, its outer edge starts at inner sixth, and is indented in middle of wing, reaching dorsum at inner third; the middle fascia consists of three superimposed spots, the upper at middle of costa, its lower end pointed and touching the middle one which is oval and horizontal, the dorsal spot is before anal angles and well defined on inner side only. The outer semi-fascia is in the shape of a large rounded spot on outer third of costa and reaching to upper third of wing, between it and dorsum is a small shade of dark scales. The two inner fascia are somewhat overcast with yellowish, and the outer spots with olivaceous gray. Between the inner and middle fasciæ the ground color forms a distinctly outlined white fascia, with a few vertical strigulations of gray, Before the termen is a line of black scales, not reaching apex and below middle broken into three dots. Cilia grayish fuscous, with a darker line at base.

Hindwing: pale brown, darker outwardly, cilia whitish and darker basal line. Underside yellowish-white mottled at apex.

Underside forewing: smoky brown, mottled with darker, costal spot repeated.

One ♂ specimen. Wellington, B. C., April, Rev. George W. Taylor.

Olethreutes devotana sp. nov.

Expanse 14 to 15 mm.

Head and palpi fawn-brown; antenna gray, brown at base; thorax reddish-purple; patagia lilaceous-gray and the same color at base of tuft; abdomen and legs pale-ochreous, latter faintly dusted with brown.

Forewing: blackish-bronzy-brown, overlaid with metallic-blue on inner half below costal spots and on dorsum before anal angle. In the middle of dorsum is a large rounded cream-white spot; the apical fifth of wing is cream-white, indented by a brown shade from apex, opposite the inner end of which is a round patch of metallic-blue; thus the white is nearly divided into two spots, the smaller, triangular one on costa before apex and the larger one lying within the lower half of termen. There is a dot of blue in the latter near its upper edge, and an oblique streak of blue crosses the dark apical shade from the costal spot before it. Over the ocellic area are shining white scales. Cilia brown at apex, white below middle.

Hindwing and underside both wings fuscous-brown.

Three specimens. Hastings, Fla., June 8th, A. T. Brown; Ch. Harbor, Fla., March (Hulst collection), Dr. Dietz; Florida, Prof. Fernald.

Cotypes in Prof. Fernald's and my collection.

Eucosma pandana sp. nov.

Expanse 24 to 28 mm.

Head, palpi and thorax whitish-cinereous, speckled with brownish-fuscous; apical joint of palpi black; antenna cinereous; abdomen pale cinereous; legs whitish, dusted with fuscous.

Forewing: dark reddish-brown, heavily overlaid with white-tipped scales; the whitish color forms a wide fascia from middle of costa to dorsum; its inner line angles outwardly to middle of wing, then obliquely inward to inner fourth of dorsum. The outer line is not clearly defined, but is as a shade from middle of costa to outer fourth of dorsum. Beyond this and parallel to it is a band of the darker color, outwardly edged with whitish scales; it curves inward slightly at end of cell and terminates in anal angle. On the outer third of costa are four obscure dark costal spots outlined with white. The ocellus consists of an irregular cluster of slightly shining whitish scales. Cilia same as wing, preceded by an irregular line of white.

Hindwing: light smoky-fuscous; cilia paler and preceded by a darker band. Underside smoky-fuscous, strigulated with fuscous. Underside forewing smoky-fuscous, minutely dotted with whitish; costa dotted with pale-ochreous and dark-brown spots.

Five specimens. Wilgus, Cochise Co., Ariz., Dr. Barnes; Kerrville, Texas, Dr. Barnes.

Eucosma nandana sp. nov.

Expanse 26 to 30 mm.

Head: brownish-gray, speckled with whitish; palpi gray-black, speckled with whitish; antenna light fuscous; abdomen pale cinereous, speckled with light brown; anal tuft reddish-brown; legs whitish, powdered with brownish-fuscous.

Forewing: ochreous-gray; the tips of many of the scales are white, giving a powdered appearance over the whole surface; the ochreous-gray are replaced by blackish-brown scales in an obscurely defined band from inner third of dorsum to outer three-fifths of costa. This dark fascia is clearly defined on its outer edge, and is indented a quarter below costa. In some specimens the dark shade extends to base; in others it is lost before reaching the inner fourth. On the outer end of wing a similar darker line starts from near apex, obliquely, to end of cell in middle of wing, then angles outward, then inward to dorsal margin at outer fourth. Beyond this are some dark vertical strigulæ. The dark lines are caused by the absence of the white tips to the scales. Cilia brown, thickly dotted with white.

Hindwing: pale fuscous in ♂, darker fuscous in ♀; cilia fuscous, dotted with darker scales; underside pale cinereous; underside forewing smoky-brown.

Six specimens. Rounthwaite, July, Marmont; Regina, Sept., Willing; Chicago, Ill.; Iowa, Gillette, Acac. Cat., 142.

Cotype in U. S. Nat. Mus.

Eucosma mandana sp. nov.

Expanse 18–19 mm.

Head, thorax and antenna rusty brown; palpi cream color, fuscous outwardly; abdomen whitish-fuscous, tuft darker; legs whitish-fuscous, dusted with brown.

Forewing: rusty brown, mottled with darker brown on costa, the outer half of costa obliquely striped with reddish and pink lines, between these are lines of dull leaden scales, the longest extending from outer fourth of costa to middle of termen. The ocellic spot contains two or three short black lines, the vertical sidebars are dull leaden. Cilia gray, powdered with black.

Hindwing: light fuscous, cilia whitish; underside the same.

Underside forewing: smoky fuscous, ochreous-brown on costa, mottled with darker brown.

Four specimens. Montclair, N. J., July 1st, Light Trap; Washington, D. C., June, at light, A. Busck; Plummer's Island, Md., July 9th, A. Busck.

Cotype in U. S. Nat. Mus.

Eucosma landana sp. nov.

Expanse 23 mm.

Head, palpi and thorax black, finely speckled with whitish-gray; antennæ fuscous; abdomen whitish-gray; mottled with fuscous; legs whitish, powdered with gray above and annulated with brownish fuscous on the tarsi.

Forewing: dark gray, evenly speckled all over with whitish. Cilia pale gray, speckled with whitish internally.

Hindwing: light smoky fuscous, with darker mottlings around external edge, cilia whitish; underside light ochreous-fuscous, mottled along costa with brown and a few dots of same color along outer margin.

Underside forewing: same as hind wing, but a shade more gray and less ochreous, mottled with brown along costa and external margin.

Four specimens. Rounthwaite, Manitoba, Can., April 25th, collected by L. E. Marmont; Aweme, Man., May 18th to June 12th, Norman Criddle.

This species is unlike any Tortricid I have ever seen; its very distinctive and unique color plan will make it easily recognizable.

Eucosma canariana sp. nov.

Expanse 28–34 mm.

Head: canary-yellow; palpi pale clay-brown; antennæ same as palpi, yellow at base; thorax canary-yellow, somewhat paler in the middle and the ends of patagia; abdomen cream color; legs, pale clay-color, with a yellowish tinge.

Forewing: shining silvery-white, with two canary-yellow lines from base to termen; the upper line starts on costa at base, continues in a straight line to termen, where it curves up and ends at extreme apex; the second line begins at the middle of base, continues in a slightly curved line below the fold to anal angle, at end of cell it sends an oblique spur up to the upper line; at the anal angle it continues up to the termen for a distance equal to its own width, then continues up through the cilia almost to the apex. These yellow lines are lightly dotted with brown on their outer ends. Cilia, except as noted, pale yellowish-cream. Male costal fold yellow.

Hindwing: pale fuscous, cilia white; underside whitish.

Underside hindwing: smoky fuscous, cream color along costa.

Eight specimens. Stockton, Utah, Aug. 1st to 11th, Tom Spalding; Utah, July, O. C. Poling; Southwestern Colorado, July 11th and 14th, W. E. Dietz; Glenwood Springs, Colo., Aug., W. E. Dietz.

This species is closely allied to *E. crambitana* Wlsm. The lines of the latter are Indian red; the upper line ends in a strong fork, and the spur from lower to upper line is absent.

Eucosma fandana sp. nov.

Expanse 32 mm.

Head and thorax olivaceous-yellow; palpi and antennæ pale clay color; abdomen silvery white, anal tuft pale clay; legs white, dusted with pale fuscous.

Forewing: a light olivaceous-yellow, with two silvery-white horizontal lines. The upper begins on costa at inner fourth and ends in apex, beyond the middle the costa along this line is edged with yellow. The second starts at base, and runs in nearly a straight line through middle of wing nearly to termen, at its outer end it turns upward and points towards apex. At the extreme base the white color spreads to dorsal margin. Cilia yellowish-cream.

Hindwing: fuscous, cilia white, clouded with fuscous; underside paler fuscous, white along costa.

Underside forewing: smoky fuscous, yellowish along costa and white below vein 1*b*.

One specimen. Denver, Colo., Oslar.

Belongs in the same group as *crambitana* Wlsm. and *canariana* Kearf., but whereas in these two species the silvery white is the predominant color, in this one the reverse is the case.

Eucosma spaldingana sp. nov.

Expanse 14–20 mm.

Head, palpi, thorax and abdomen white; antennæ pale fuscous, with a whitish bloom; legs white, dusted with light brown.

Forewing: silvery-white, with two transverse narrow bands, and patch in apical end pale clay-yellow, rather heavily overlaid with Indian-red scales. The inner line starts from inner fourth of dorsum, and reaches costa at inner third, it follows costa to beyond half and again crosses wing, obliquely to dorsum, before anal angle, where it broadens out and covers the outer third of dorsum. From middle of wing at end of cell it sends a spur into apex, this broadens below apex into a large patch covering the upper two-thirds of outer fourth, with a few scattered scales continuing along termen to anal angle. On the costa, just before apex, the dark color encloses a small spot of white. The male costal fold is of the dark color and a small patch of same below it. Cilia white.

Hindwing: silvery-whitish-fuscous; underside the same, cilia white.

Underside forewing: pale clay-yellow, mottled with pale brown.

Fourteen specimens. Stockton, Utah, June 19th to Aug. 11th; all collected by Tom Spalding.

Eucosma gandana sp. nov.

Expanse, ♀, 33 mm.

Head and thorax pale yellow; palpi and antennæ pale clay-yellow; abdomen white, with a faint yellowish reflection; legs cream color, dusted with darker clay-yellow.

Forewing: very pale yellow, without stripes or marks; a shade paler along costa and in outer fourth beyond cell. Cilia the same.

Hindwing: white, finely checkered with very light fuscous, cilia white. Underside the same.

Underside forewing: yellowish-fuscous.

One ♀. Denver, Colo., Sept. 10th, Oslar.

This species is of the same shape and general appearance as *crambitana* and *canariana*. I would not venture to describe it from one ♀ except that it can be easily recognized by its uniform wing coloring without marks of any kind.

Eucosma handana sp. nov.

Expanse 23–30 mm.

Head and thorax pale brown; antennæ pale brown, dusted with darker brown outwardly; antennæ clay-yellow; abdomen and legs pale fuscous, latter dusted with light brown.

Forewing: clay-yellow, rather heavily overlaid with pale pinkish terra-cotta-brown. There are no well defined fasciæ or spots; the darker shade forms an obscure triangular patch, with base resting on dorsal margin between inner and outer fourths, the point of the triangle reaching top of cell a third from base. On the outer third are vertical irrorations of shining clay-yellow. The edge of the costa is reticulated with the two shades. Cilia clay-yellow, inwardly edged with a slightly darker line.

Hindwing: pale clay-yellow, the veins overlaid with light terra cotta. Cilia whitish. Underside the same.

Underside forewing; clay-yellow, reticulated with pale brown.

Five specimens. Stockton, Utah, July; collected by Tom Spalding.

This species will go in the group of *grandiflavana* Wlsm. *subflavana* Wlsm. and *larana* Wlsm.

Eucosma kandana sp. nov.

Expanse 18–20 mm.

Head, palpi, antenna and thorax clay-yellow: abdomen whitish-yellow, tuft darker; legs pale clay-yellow.

Forewing: clay-yellow, reticulated along costa and outer third with very pale brown. There are several irregular vertical shining streaks of clay-yellow from costa before apex, two of which reach to anal angle and form the two vertical bars of an obscure ocellic spot, between and on each side of the bars and also in the apex are a few tiny dark brown dots. Cilia pale brown, dotted internally with dark brown.

Hindwing: much darker than forewing, smoky brown, cilia pale brown; underside the same but a shade lighter.

Underside forewing: sams as upperside of hindwing, with the reticulations repeated along the costa.

Six specimens. Stockton, Utah, Aug. 4th to 17th; collected by Tom Spalding.

This species belongs with the *irroratana* Wlsm. and *atomosana* Wlsm. group.

Eucosma floridana sp. nov.

Expanse 18–22 mm.

Head, palpi and thorax white, with large spots of very pale terra cotta on the crest of the head, base of antenna, posterior end of thorax and end of patagia; antenna whitish-fuscous; abdomen cinereous, anal tuft whitish-ochreous; legs pale terra cotta, dusted with fuscous.

Forewing: pale terra cotta, darker towards apex, lighter below costa, the extreme costa is a darker shade and profusely marked with white dots, the dots on the outer half are continued as lines of shining opalescent scales, from the outer fourth the line runs obliquely to termen below apex; the line before this, from costa between half and outer third, is somewhat broken and runs obliquely, paralelling the upper line, to vein 7, beyond end of cell, thence follows the vein to termen. Before the apex is a short vertical line, and dots of the shining whitish scales occur over the outer third of wing. The ocellic spot is large, whitish-gray, dotted with darker gray and blackish scales, inwardly the vertical bar of shining scales is irregular, the outer bar is missing, but a line of four or five dots of shining scales are in the outer edge of spot, Cilia gray, dotted with blackish.

Hindwing: light smoky fuscous, white above cell. Cilia gray-fuscous. Underside both wings smoky fuscous.

Forewing: darker and mottled with pale ochreous along costa.

Seven specimens. Hastings, Fla., Oct. 6th to 15th; collected by A. J. Brown.

This species will go in the group with *cataclystiana* Walk.

Eucosma randana sp. nov.

Expanse 24–28 mm.

Head, palpi and thorax grayish-brown; antenna and abdomen fuscous; legs whitish powdered with light brown.

Forewing: light ocherous-brown, closely strigulated on costa and outer half of wing with vertical black lines. Ocellic spot very large, white, with three horizontal rows of five each quadrate spots, overlaying these black spots, on the inside, in the middle and the outer edge are short vertical bars of raised (curved over, flattened), leaden, shining scales. There are five short lines of these same scales from costa between end of male costal fold and apex, each ending in a white spot on extreme edge of costa, the line before apex is longest and paralelling termen, ends above the bar outlining the ocellic spot. Four smaller dots before the ocellic spot. Cilia white, atomized with black.

Hindwing: smoky fuscous, cilia whitish; underside grayish-fuscous.

Underside forewing: dark smoky fuscous, with costal spots repeated in pale ochreous.

Eight specimens. Denver, Colo., Clear Creek, Colo., June 16th; all collected by E. J. Oslar.

This species is very much like *E. circula* Hbn., but the size is very much larger, and the costal and ocellic spots are somewhat differently arranged.

Eucosma sandana sp. nov.

Expanse 19–24 mm.

Head: whitish clay-yellow: palpi white, dusted on outside with pale-clay yellow; antenna pale gray; thorax whitish in front, clay-yellow in middle and gray behind; abdomen shining cinereous, tuft clay-yellow; legs whitish, dusted with ochreous.

Forewing: ochreous-brown, inner half of costa, above cell, whitish, dotted with brown; ocellic spot large, covering almost the entire outer fourth of wing, finely dotted with black in a large round spot, in the lower half are three horizontal black lines, crossed by three vertical bars of shining golden scales. From the outer half of costa are two long lines of shining scales, the inner runs obliquely outward to end of cell, then vertically downward inside the ocellic spot, but separated from latter by a line of ground color; the outer runs obliquely, outlining the ocellic spot above to termen below apex. A few metallic dots on interior of wing. The outer half of costa is marked with small wedge-shaped whitish spots, separated by the brown ground color. Cilia gray, powdered with black dots.

Hindwing: pale gray, cilia whitish; underside the same.

Underside forewing: ochreous gray.

Three specimens. Volga, S. Dak., W. E. Dietz; Chimney Gulch, Golden, Colo., Sept. 3, E. J. Oslar.

Eucosma reversana sp. nov.

Expanse 17–19 mm.

Head, thorax, palpi and abdomen white, shaded with pale brown on outer side of patagia and palpi; antenna white, finely annulated between joints with fuscous; legs white, powdered with clay-yellow.

Forewing: white, with grayish-brown spots and semi-fasciæ; below the costa these dark spots and bands all incline inward, that is, nearer the base on their lower ends and nearer the apex at their upper ends. There is an obscure patch of dark scales in middle of wing at base; from inner fourth of dorsal margin a fascia runs obliquely outward above middle of wing, broader at its upper end; a band lies obliquely over end of cell, twice as long as wide and not touching either costal or dorsal margin; on outer fourth of dorsum a short oblique patch borders inner side of ocellic spot; from apex is a short streak to middle of wing, broadening out below. The costa is marked with alternate white and brown dashes, the white dashes on outer half are geminate, and the pair before the apex curve downward and outward into termen below apex. Ocellic spot obscure, a few dots of dark brown, bounded on each side by vertical bars of shining white scales. Cilia white, dotted with black.

Hindwing: yellowish-gray, cilia white; underside the same.

Underside forewing: smoky gray, costal spots repeated.

Three specimens. San Antonio, Texas, Dr. Wm. Barnes.

This species much resembles *E. atomosana* Fern., but can readily be separated, as the direction of the stripes are reversed.

Eucosma brightonana sp. nov.

Expanse 13–16 mm.

Head, palpi and thorax grayish-brown; palpi, abdomen and legs fuscous.

Forewing: gray-brown; a large dark brown spot on dorsum, between inner fourth and middle, extending to middle of wing, pointed on top, rounded on sides; a smaller spot of same shape and color on dorsum before angle; from the middle of costa an irregular narrow fascia goes obliquely to middle of wing at end of cell, sending a wavy line down to the dorsal spot before angle. Beyond this is a paler gray brown fascia, beginning on fascia as a germinate spot, broadening below until it involves all of the ocellic space. Beyond it on costa are three paler geminate streaks. A darker shade in apex. Cilia dark gray.

Hindwing: smoky fuscous, cilia brownish-gray; underside of both wings the same, with a dark spot in apex of forewing.

Seven specimens. New Brighton, Pa., July 29th to Aug. 10th; all collected by F. A. Merrick.

Eucosma tandana sp. nov.

Expanse 20–22 mm.

Head, palpi, antenna and thorax grayish-brown, patagia whitish posteriorly; abdomen brownish-white; legs yellowish-white.

Forewings: grayish-brown, darker on the male fold, and the trace of a darker fascia from middle of costa; the costa in the outer half is faintly strigulated with brown. These marks are all very faint and inconspicuous. There are two prominent dark brown spots; one before the middle of wing, resting on dorsum, its upper end touching fold, it is about as wide as long and slightly rounded on the sides; in one specimen a streak of brown is continued up above middle of wing and connecting with the obscure central fascia. The other spot is in the apical end of the wing; it rests on costa before apex and extends down nearly to anal angle, it is nearly straight on its outer edge and convex on its inner edge, its length is twice as long as its width on costa, there is a narrow line of ground color between the upper two-thirds of its length and termen. Cilia gray-brown.

Hindwing: smoky brown, cilia paler; underside gray-brown, a shade darker along costa.

Underside forewing: smoky brown, spotted with dull ochreous along costa and termen.

Four specimens. Algonquin, Ill., July 8th, Dr. Nason; New Brighton, Pa., July 18th, F. A. Merrick; Arlington Heights, Ill., Aug. 15th, A. McElhose; Iowa, Ac. Cat. U. S. Nat. Mus., 985, Gillette.

Cotype in U. S. Nat. Mus.

Eucosma vandana sp. nov.

Expanse 12–16 mm.

Head, palpi and thorax whitish to grayish-brown, apical joint palpi black; antennæ whitish-gray; abdomen fuscous; legs whitish, powdered with brown.

Forewing: dull blackish-brown; obliquely striped with grayish-white along costa; the line from outer fourth runs to termen beneath apex, the line from costa, immediately before apex, follows termen to below middle. The ocellus is above the anal angle and consists of two broken horizontal lines of gray and white. Between the middle of wing and dorsum are oblique strigulæ of white, from the inner third to anal angle. Before this strigulation is a reddish-brown patch. Cilia gray-brown, dotted with pale fuscous. In some specimens these whitish lines are nearly obsolete, the entire surface of wing being a dull mottled blackish-brown.

Hindwing: dark smoky fuscous, cilia a shade paler; underside gray fuscous.

Underside forewing: smoky fuscous, flected with dull ochreous on costa.

Sixteen specimens. Hastings, Fla., March, April, and Oct.; collected by A. J. Brown.

Eucosma wandana sp. nov.

Expanse 17 mm.

Head and palpi ochreous-brown, blackish-brown at outer ends of tuft over eyes and outer ends of palpi; antenna blackish-brown, faintly annulated with ochreous-brown between joints; thorax black-brown; patagia ochreous-brown; abdomen blackish-fuscous, whitish beneath; legs whitish on underside, heavily powdered with fuscous above.

Forewing: blackish-brown, more or less mottled with gray and ochreous scales; beneath fold, in ocellic space and a small spot on costa before apex, grayish-ochreous. The ocellic spot contains three horizontal black lines, the vertical bars shining gray-white, the outer is broken. There is a conspicuous dark shade on fold from base to inner third, and beyond the outer end of it, above the gray-ochreous dorsal patch are a few white scales. From the costa beyond the male fold are four pairs of white dashes, becoming silvery metallic below costa; the inner pair send a broken line to the inner ocellic bar, the second pair send a line, which connects with a short line from the fourth pair, into the outer ocellic bar. There are two black dots below the fold, one close to base and the other about one-sixth from base. Cilia dark gray, dotted with black.

Hindwing: dark smoky brown, paler at base, cilia gray, underside smoky-brown.

Underside forewing: dark smoky brown; costal spots repeated.

One ♂ specimen. Cincinnati, Ohio, Aug. 25th; Miss Annette F. Braun (No. 164).

Eucosma xandana sp. nov.

Expanse 12–17.5 mm.

Head, palpi, antenna and thorax gray; apical joint, palpi black; abdomen fuscous; legs gray, tarsi powdered with black.

Forewing: pale whitish-gray, with two narrow brown-black fascia; the inner from inner fifth of costa to inner fourth of dorsum widens out at middle of

wing to three times its width above and narrows below middle to half the widest part; the outer starts from middle of costa and runs obliquely to dorsum before anal angle, the upper half is very narrow and convex outwardly, from middle to above fold it widens four times its width above but contracts slightly before reaching dorsum. On the ground color between base and first fascia are about six brown dots above fold and four below; between first and second fasciæ are two brown dots on costa and two below them, and two faint lines on dorsum; between second fascia and apex are seven brown dots in costa and one in apex, each is duplicated below costa; there is an irregular row of brown dots on termen and a short vertical line of same from anal angle, on each side of which are one or two scattered dots. Cilia pale fuscous, preceded by darker line.

Hindwing: pale gray, cilia same, but shining; underside the same.

Underside forewing: smoky gray, costa faintly dotted with brown.

Nine specimens. Cincinnati, Ohio, March 6th to 26th; collected by Miss Annette F. Braun.

Eucosma yandana sp. nov.

Expanse 16–19 mm.

Head and antenna gray; palpi pale gray; thorax gray, speckled with brown; abdomen grayish-fuscous, anal tuft pale yellow; legs gray, tarsi annulated with brown.

Forewing: whitish-gray, lightly strigulated and dotted with fuscous. There is a semi-fascia from inner fourth of dorsal margin to middle of wing, with a small round dot above and below the fold. The middle fascia starts from middle of costa as a narrow brown line to end of cell where it widens out into a small patch of brown, then continues as a narrow line to outer fourth of dorsal margin. Between these fasciæ is a faint line of brown from dorsum to above middle. There is a small rounded patch of lighter brown in the apex and between it and male costal fold are four or five darker brown oblique costal lines. Between veins 6 and 7 is a row of four brown dots, with a vertical line of brown below the inner and outer to the dorsum. A terminal line of brown. Cilia shining grayish-fuscous.

Hindwing: gray, darker at apex, cilia light shining gray above and beneath.

Underside forewing: smoky gray, costal spots repeated, whitish-gray and brown along termen.

Nine specimens. New Brighton, Pa., March 26th to April 11th; collected by F. A. Merrick.

Eucosma zandana sp. nov.

Expanse 14–16 mm.

Head, antenna, thorax and abdomen dark blackish-gray; palpi light gray, outer end of tuft and apical joint black; legs gray, dusted with dark brown.

Forewing: gray, mottled with darker shades of gray and brown. The lower half of wing between outer third and anal angle is whitish-gray, strigulated with oblique dark grayish-brown lines. The costa beyond the male costal fold is marked by six or seven brown-black dots, separated by gray. Beyond the cell on upper half of wing is a semi-circle of black dots, with the open side below. Cilia brownish-gray, preceded by a dark terminal line.

Hindwing: smoky brown, cilia shining gray-brown, underside the same.
Underside forewing: dull smoky brown, with dull ochreous spots on costa.

Seven specimens. Cincinnati, Ohio, March 26th to May 7th; collected by Miss Annette F. Braun.

Eucosma bobana sp. nov.

Expanse 22–26 mm.

Head: pale clay-yellow; palpi same, dusted with fuscous outwardly, apical joint fuscous; antenna pale clay-yellow, the segments dusted with brown; thorax pale clay-yellow, shaded with bright ochreous-brown in front and at base of patagia; thorax and legs whitish-gray, the latter dusted with light brown.

Forewing: alternate bands of bright ocherous and dark reddish-brown, these bands are broken and their direction changed at the middle of the wing, giving the surface a checkered appearance. The extreme base is narrowly white, followed by a wider ochreous band, then by a white band, marked below fold with an ochreous spot and on upper vein of cell with a brown spur from the next outer fascia, the latter begins at inner fifth on costa as a blackish streak, becomes narrow below costa to middle of wing, then widens to dorsal margin which it reaches at inner quarter, below the costa it is ochreous and brown, outwardly edged with dark brown. It is followed by a broader ochreous fascia, interrupted just above middle by a spur from the succeeding dark fascia. The latter begins as a rich brown spot on costa to upper vein of cell, where it is cut by a horizontal streak of black and brown scales, the downward continuation of the fascia starts from outer end of this streak, and is rich brown, having a strong lobe on its outer edge. Beyond this, above middle of wing, is a large patch of ochreous and white scales, with two brown dots on costa. Beyond it is a subapical brown and black patch, triangular in shape, with a point touching costa, an inner spur below the yellow patch before it, and a curved streak along the lower half of termen, this latter streak becomes yellow shortly before the middle. On the lower half of outer fourth is a curved ocherous patch, with a small dash of fuscous scales at anal angle. The ochreous patches and fasciæ are all outlined by white, and the brown patches usually outlined by black or darker brown. Cilia white, fuscous at apex, and two dashes of fuscous below apex.

Hindwing: pale fuscous, cilia white, underside whitish-gray, powdered with fuscous below costa.

Underside forewing: smoky fuscous, with costal spots repeated.

Three specimens. Salida, Colo., June 11th; Southwestern Colorado, July 13th; Harris Co., Texas, July 5th. All from Dr. W. G. Dietz.

Eucosma cocana sp. nov.

Expanse 19 mm.

Head: ochreous-brown, darker on sides and collar; palpi dull ochreous, outside and apex heavily dusted with blackish-gray; thorax ochreous-brown, crossed by two narrow lines of whitish, outer ends of patagia and posterior end of thorax gray and white; antenna dark fuscous; abdomen shining gray, anal tuft clay-yellow; legs whitish, heavily overlaid with speckled gray and brown scales.

Forewing: soft Indian-red, or the tint known as old-rose, crossed by numerous

vertical lines of shining gray raised scales; at the inner third there is a narrow transverse line of ochreous, and the ocellic patch is the same color, both edged with the gray lines. Between apex and first ochreous line are two other gray lines, somewhat broken; the extreme base is gray, sending a streak around dorsum to inner fourth. Between the ochreous fascia and ochreous ocellic spot is a broad, partly geminate band of gray. On the outer half of costa at end of each vein is a spot of gray. From the apex a gray line runs obliquely inward over vein 7, about half way to end of cell, then angles obliquely downward ending on termen over vein 5, and enclosing a terminal patch of bright ochreous. The male costal fold is dark gray, with three or four whitish spots at the beginning of the inner gray lines. Cilia gray, cut with white at end of each vein.

Hindwing: smoky brown, cilia pale fuscous; underside gray, mottled with fuscous below costa.

Underside forewing: smoky fuscous, whitish on termen, costal spots faintly repeated.

One ♂ specimen. Tryon, N. C., May 17th; collected by W. F. Fiske.

Eucosma sonomana sp. nov.

Expanse 20 mm.

Head: pale fawn; palpi pale fawn within, dark gray, speckled with whitish, without; outer joint black; antenna leaden gray, thinly annulated with white; thorax grayish-fawn, base of patagia reddish-ochreous; abdomen dark fuscous, anal tuft black; legs pale fawn, dusted with blackish fuscous.

Forewing: coppery-red, darker on inner half, shading into coppery-ochreous at termen. There are two shining leaden-gray transverse fascia, the inner from inner fourth of costa to inner third of dorsum is composed of two pairs of lines, the inner edge deeply concave in the middle, and with some irregular lines of the same color in base, enclosing a round spot of the reddish ground color. The outer fascia begins on costa beyond middle as two long whitish dashes. Contracts at top of cell, below which is an irregular ring of darker leaden scales which connect with a whitish line to dorsum at outer fourth, with a spur to anal angle. The inner of a pair of white dashes on costa, before apex, sends a whiitish shining line to middle of termen. Between this line and outer fascia the costa is marked with two white dashes and streaked with gray. Cilia white, with an outer edging of fuscous, and a dark fuscous basal line, below apex, which is interrupted by a white dash over each vein.

Hindwing: smoky gray, preceded by a darker line, following a paler basal line. Underside both wings the same, but forewing a shade darker and marked with white on costa, also white ciliate dashes repeated.

Three ♂ and one ♀. Sonoma Co., Cal., May; Carmel-by-the-Sea, Monterey Co., Cal., April. All collected by Arthur H. Vachell.

Eucosma dodana sp. nov.

Expanse 16.5–24 mm.

Head: cinereous; palpi ashy-gray; antenna fuscous; thorax black, speckled with cinereous; abdomen dark fuscous, lighter on side and tuft; legs pale gray, dotted with fuscous.

Forewing: light gray, with large spots and fasciæ of blackish-brown. The basal area extends in middle of wing to inner fourth, receding to costa and dorsum, it is black outwardly, gray towards base; on inner third of costa is a large black spot and another before anal angle on dorsum, a third one is between these two in the middle of wing over outer third of cell, the three forming a broken fascia. On the costa are three large black spots, with a fourth in apex, which enlarges below, then contracts and follows termen to anal angle. The gray areas between these dark spots are vertically strigulated with blackish-brown. This description is from the most intensely marked specimen, in others, the dark spots are contracted and the gray color predominates, sometimes dividing the spots, and in others the large dark spots are almost lost. Cilia yellowish-gray, dusted with fuscous.

Hindwing: dark gray, cilia paler; underside both wings a uniform gray, with costal spots repeated.

Ten specimens. Southwestern Colorado, July 13th, Dr. W. G. Dietz; Colorado, Dyar and Caudell.

Cotypes in U. S. Nat. Mus.

Eucosma fofana sp. nov.

Expanse 21 mm.

Head, palpi and thorax dark ochreous-gray, heavily dusted with fuscous, and dotted with black on patagia; antenna dark fuscous; abdomen grayish fuscous, tuft ochreous-fuscous; legs gray, banded with white and powdered with dark fuscous.

Forewing: whitish-gray, spotted and strigulated with black-brown. There is an obscure dark fascia from middle of costa obliquely towards anal angle, it is well defined only in upper third. There are four rather large black dots on costa beyond it, the fourth being in the apex; below the second of these dots are two superimposed irregular rings, each composed of five or six dark dots; below the third is another such ring, and below it a line of dots before termen above anal angle. The basal area is not definitely defined, all of the inner half of wing is an irregular mass of large and small dots on the whitish-gray ground. Cilia yellowish-gray, preceded by a darker line.

Hindwing: smoky gray, cilia the same, but tips of scales whitish; underside yellowish-gray.

Underside forewing: yellowish-gray, dark spots repeated along costa, and rows of dark dots between the veins beyond the cell.

One ♂ specimen. Berthoud Pass, Colo., Aug. 22d; collected by A. J. Snyder.

This species strongly resembles *dodana* Kearf., and may prove to be an extreme variety of it. There is a certain formation of the markings, however, that leads me to believe it is distinct.

Eucosma hohana sp. nov.

Expanse 20–22 mm.

Head yellowish-gray; palpi yellowish-gray, with a darker streak on lower, outer side of tuft; antenna gray, annulated above with paler gray; thorax gray,

finely dusted with darker gray; abdomen fuscous, anal tuft yellow; legs cinereous, heavily dusted with blackish-fuscous.

Forewing: whitish-gray, rather evenly dusted and dotted all over with blackish-brown; the costa is evenly marked with dark dots, about twelve beyond male costal fold, the outer ones are the largest; the dot beyond the middle and one on outer third are followed below by short lines of dots, opposite them on dorsum, two strigulæ rise almost to middle; between each pair of these the ground color is rather free from dark dots and appears lighter. There is an obscure shade from apex to lower end of cell, it widens out in the middle above and below, there is a similar but smaller shade in the middle of the wing. There is a whitish preciliate line; cilia fuscous, extreme tips whitish.

Hindwing: above and beneath light yellowish-gray, cilia same.

Underside forewing: smoky fuscous, darker spots on costa.

Two specimens. Mt. Piran, Alberta, Aug. 17th; Dr. Wm. Barnes.

Eucosma kokana sp. nov.

Expanse 20–21 mm.

Head, palpi, antenna and thorax gray, heavily dotted with fuscous; abdomen fuscous; legs pale clay-yellow, powdered with brown.

Forewing: whitish-gray, shaded with brown on interior of wing from base to end of cell. On outer half of costa are five flattened streaks of brown, from each of which is a line of brown below, the two interior join and run outward over vein 7, from the third and fourth the lines join a third below costa and continue as one into anal angle, the outer spot, before apex, is rounded, and has no line from it. Inside the termen is a brown line slightly concave towards its outer side. Cilia gray, dotted with fuscous-brown.

Hindwing: smoky gray, cilia paler, underside yellowish-gray.

Underside forewing: dark smoky gray, lightly dotted with dull ochreous along costa.

Two specimens. Cincinnati, Ohio, Nov. 3rd, Miss Annette F. Braun; Scranton, Pa., Oct. 8th, A. E. Lister.

The Scranton specimen is much lighter than the description, the lines in the outer third being obsolete and the brown shade over interior less dark.

Eucosma lolana sp. nov.

Head: yellowish-brown, lighter over eyes and in front; palpi yellowish brown, dark brown on outside; antenna cinereous, finely annulated with black; thorax dark brown, yellowish posteriorly and ends of patagia; abdomen fuscous, paler at outer ends of joints, tuft yellowish; legs cinereous, powdered and banded with dark brown.

Forewing: dark brown or black, heavily overlaid with ochreous-brown scales; there is a conspicuous white fascia from inner fourth of costa to inner third of dorsum, it is concave on its inner edge and slightly convex on the outer with a short spur a third from dorsum. There are three brown dots on costa of outer third of wing, enclosed by a cream-white patch which connects with the cream-white ocellic spot, forming an outer white fascia. There is a row of black dots

on each side of this outer fascia, and a few on the sides of the inner and many others in the dark ground color between the fascia and in basal area. There is a short vertical bar of leaden scales through the ocellic spot, and a few scales of the same color are scattered over the apical fourth. Cilia light fuscous, preceded by a darker line.

Hindwing and underside of both wings very dark smoky brown, cilia pale fuscous, costal spots repeated.

Two specimens; Colorado, Gillette and Dyar and Caudell.
Cotype in U. S. Nat. Mus.

Eucosma momana sp. nov.

Expanse 22 mm.

Head and palpi clay-yellow, clouded with smoky black on bases of antennæ, tips of scales on collar, outer end of palpi and a spot of the same on upperside of second joint of palpi near its base; thorax black, mottled with gray; abdomen white, at end of each segment fuscous between; legs white, banded and powdered with black.

Forewing: white, lightly strigulated with pale fuscous; there is an obscure pale fuscous fascia at inner fourth, and much broader across wing beyond middle, its inner edge starts from before middle of costa and goes in a straight line obliquely to within a third of dorsum where it angles inward and reaches dorsum at outer third; the outer edge starts from outer third of costa and curves unevenly to anal angle. There is a narrow broken fascia from a quadrate black spot on costa before apex, which divides in the middle of wing, one limb following the termen and the other to anal angle. There is a lunate brown apical spot extending into the cilia as black scales. The costal edge is white, with numerous black dashes for its entire length. Cilia below apex leaden-gray, cut with three or four white dashes.

Hindwing: smoky brown, white above cell, cilia leaden, white outwardly; underside the same, but a shade paler.

Underside forewing: smoky brown, with costal and ciliate marks repeated.

One ♂ specimen; Yuma Co., Ariz., desert, April 10th, received from J. B. Smith.

Eucosma nonana sp. nov.

Expanse 24 mm.

Head and palpi white, shaded with black over the eyes and on the sides of the palpi; antenna pale fuscous; thorax white, heavily dotted with black at base of patagia; abdomen fuscous; legs whitish, banded and dusted with black.

Forewing: white, powdered with black and olivaceous scales. A dark shade runs through middle of wing from base to apex. Between inner third and middle of dorsum a white line goes obliquely outward to above middle of wing, it is bounded on the inside by a line of black scales; on each side of it there is a short line of black in the fold. There is a row of black dots on outer half of dorsum. The costa is sparsely marked with small black dots and dashes its whole length. The ocellic spot is obscure, defined on inner side by a short vertical bar of shining whitish scales. Cilia white, fuscous at apex and several streaks of fuscous and black scales below apex.

Hindwing: light smoky fuscous, white above cell, cilia whitish; underside pale gray, a few black dots below costa and in apex.

Underside forewing: smoky fuscous, whitish on costa, dotted with brown, white below fold.

One specimen, Pueblo, Colo., H. W. Nash.

Eucosma popana sp. nov.

Expanse 15-18.5 mm.

Head, palpi and thorax white, dotted with black; a spot of black on upper side towards base and outside towards apex of second joint of palpi; antenna whitish; abdomen whitish, anal tuft cinereous; legs pale gray, dusted with brown.

Forewing: white, with fascia and spots of blackish-brown. An oblique fascia from inner third of dorsum to middle of wing, between it and base several wavy lines from dorsum to middle. At anal angle a triangular spot with its apex above middle. An oblique shade below costa to middle, over end of cell; a spur from its outer end joins another shade which runs below costal marks and into apex. Before apex, in outer half, are four triangular costal spots, on inner half of costa numerous small dots. The dark spots are all of blackish scales tippped with white; giving them a speckled appearance. Ocellic spot shining cream color, divided by a narrow brown vertical line, from its upper edge a narrow white line follows termen to apex. Cilia speckled white and black.

Hindwing: pale fuscous, darker at apex, cilia paler, underside the same.

Underside forewing: darker fuscous, whitish on costa, with dark costal marks repeated.

Twenty-seven specimens; Stockton, Utah, June 1st to Aug. 8th; collected by Tom Spalding.

Eucosma rorana sp. nov.

Expanse 15-20 mm.

Head: clay-yellow, a streak of light brown across the middle; palpi clay-yellow, a spot of fuscous above on outside of tuft and at end of tuft below, apical joint fuscous; antenna whitish; thorax white, mottled with light brown; abdomen fuscous, anal tuft clay-yellow; legs whitish, dusted and banded with black.

Forewing: white, with bands and spots of blackish-brown. The extreme base is white, strigulated with brown, merging into dark brown at its outer edge, which is obsolete on costa, extends nearly to inner third at middle in the form of a rounded spot, and to inner fourth on dorsum as another spot, the two being separated by a pale shade. There is a well-defined dark fascia from midddle of costa to dorsum before angle, it is deeply indented, by the intervening white fascia, on its inner edge a third above dorsum. Beyond it is the ocellic spot which is a well-defined rectangle of shining cream-white scales, divided by a dark vertical line and two black lines above. Costa before middle is marked with short dashes of brown and white; beyond middle, with four geminate oblique white lines on brown ground, the inner pair of lines end under the beginning of a third pair, the second and third pair unite and end under the fourth pair. Cilia speckled brown on white.

Hindwing: smoky fuscous, cilia paler, beneath the same but a spade paler.

Underside forewing: darker smoky fuscous, costal marks repeated.

Six specimens; Stockton, Utah, June 29th to July 3d; Tom Spalding.

Eucosma sosana sp. nov.

Expanse 16–19 mm.

Head, antenna and palpi pale clay-yellow, latter dusted with a shade darker externally; thorax clay-yellow, atomized with pale fuscous; abdomen and legs clay-yellow, latter banded and dusted with brown.

Forewing: clay-yellow, with basal area, one broad fascia and a shade on upper third of wing of a light olivaceous fuscous. This darker color is nearly uniform wherever it occurs, and is composed of olivaceous fuscous scales, with clay-yellow tips, giving an atomized or powdered appearance. The upper third of wing is of this darker shade, interrupted on the inner half of costa by five or six clay-yellow geminate dashes, those close to base are somewhat obscure, and in the outer half of costa by four strongly-defined clay-yellow geminate dashes; the dark shade between these outer dashes are somewhat ochreous below the costa; the outer dash of the second pair and inner dash of the third pair join together below costa and form a V, the lower point is tipped with golden-metallic scales; the outer dash of the third pair is prolonged beneath the fourth pair, and its lower half is leaden-metallic. From the middle of the dorsal margin a broad fascia of clay-yellow, slightly oblique, extends to upper third of wing, it is broader on dorsum than above, a horizontal line of yellow leaves it near upper end and lies below the first and second pair of geminate streaks in outer half of costa. The ocellic spot is large, clay-yellow scales, slightly shining, with in some specimens a horizontal black dash in middle and another near upper edge, two black dots occur on before the upper end of ocellic spot in other specimens. Cilia fuscous outwardly, speckled within.

Hindwing: light brownish-fuscous, cilia whitish fuscous; underside grayish, shaded with light brownish-fuscous below costa.

Underside forewing: smoky brown, costal spots repeated, yellowish before termen, with very dark terminal line.

Eight specimens; Stockton, Utah, May 23d to Aug. 2d; collected by Tom Spalding.

Eucosma totana sp. nov.

Expanse 14–19 mm.

Head, palpi, antenna, thorax, abdomen and legs ashy-white, outside of palpi shaded with pale fuscous, and dots of the same color on patagia, legs banded and powdered with pale fuscous.

Forewing: ashy-gray, lightly marked with brown shades, varying from light brown to blackish-brown. There is a dark shade through middle of wing, angulated at inner third obliquely inward toward dorsum, and forming the outer edge of basal area, but only defined in the middle of wing; a few dark dots connect this shade along middle of wing with a similar dark shade between end of cell and termen above middle of wing. The ocellic spot is concolorous, but with shining scales on sides and two or three black horizontal lines; before this spot on dorsum, and outlining it internally, is a small triangular dark spot. On the male costal fold are four or five dark dashes, between the fold and middle, two or three dark lines, one of which is as long as a third the width of wing; beyond the middle are three large dark spots, between each two a slender dark line; an oblique dark dash is in the apex. There are several dark dots below fold on internal third. Cilia white, dotted with gray internally and externally.

Hindwing: pale fuscous, cilia whitish; underside the same, with a few fuscous dots in apex.

Underside forewing: darker, brownish-fuscous, with costal spots repeated and a pale line before the darker terminal line.

Five specimens: Stockton, Utah, July 1st to Sept. 1st, Tom Spalding; South Utah, July, O. C. Poling.

Eucosma vovana sp. nov.

Expanse 16–23 mm.

Head: pale clay-yellow, with a few brown scales over eyes and in front; palpi cream-white, with two brown spots on side of brush above, outward end of brush more or less tinged with fuscous, apical joint black, with a tiny dot of whitish at extreme end; thorax white, with two brownish mottlings across front and middle; base of patagia dark brown; abdomen and legs pale yellowish-white, latter banded and dusted with brown; antenna white, finely ringed with dark brown.

Forewing: white; the markings are blackish-brown. There is a strigulation of dark scales in the base succeeded by a narrow white fascia, beyond which is a wider dark fascia, the outer edge of which starts from inner fourth of costa and is slightly oblique to fold, it broadens at fold and is then straight to dorsum; beyond it is a white fascia of about equal width, sharply defined inwardly. In the middle of costa is an oblong dark spot, its lower end reaching to middle of wing, beyond it, covering end of cell in middle of wing, is a rounded dark spot, below the latter on dorsal margin is a pair of rounded spots; these spots form a dark fascia from middle of costa to dorsal margin before the ocellus, but they are separated by white extensions of the white fascia before them. There is a wavy narrower dark fascia from costa at outer fifth to middle of termen.

Beyond the base in each of the white and dark fasciæ are three dark dashes on costa, and on the outer half are three large dark spots and as many narrow ones, with a large one in apex. The ocellus is white, with a few shining scales at side and two black dots on inner edge. The dark fascia and spots are usually outlined in blackish-brown, with strigulations of the same color, on a paler brown ground. Cilia white, preceded by a gray line, and with the gray cutting into apex and below apex.

Hindwing: pale fuscous, cilia a shade paler; underside the same.

Underside forewing: smoky fuscous, costal spots repeated.

Thirteen specimens: Stockton, Utah, Aug. 2d to Sept. 3d, Tom Spalding; Bear Creek, Morrison, Colo., E. J. Oslar; Yuma Co., Ariz., desert, March 26th, from J. B. Smith; Glenwood Springs, Colo., Aug. 24th, Dr. Barnes; Amarillo, Tex., Aug. 30th, Cockerell.

Cotype in U. S. Nat. Mus.

This species is close to *E. shastana* Wlsm. and *E. biquadrana* Wlsm.

Eucosma subinvicta sp. nov.

Expanse 30 mm.

Head and thorax creamy-white, patagia pure white; palpi creamy-white, dusted with fuscous externally; antenna yellowish-white; abdomen light gray, tuft ochreous-gray; legs white, dusted with brownish-fuscous.

Forewing: pure white, this ground color occurs in a broad fascia in middle of wing from dorsal margin to above middle, it narrows above the middle of wing and the upper third is overlaid with fuscous strigulations from costa; there is a white patch on dorsum at base below fold. There is an obscure fuscous fascia from inner fourth of costa, curving inward below middle to inner fifth of dorsum, it is marked in the middle of wing by a dentate line of black-brown scales. A fuscous fascia crosses wing from beyond middle of costa to dorsal margin, its inner edge is obliquely outward to middle of wing, then slightly inward to dorsum, it covers the outer third of dorsum. Beyond it on costa is a white patch in which are three dark brown dots, and a larger one in apex, between each two is a tiny brown dash. The ocellus is large, covering the area between the dark fascia and termen, it is mottled white and fuscous, with several small clusters of black scales on the inner side; above it are two curious characters in black and brown scales, the outer like the small letter h, and the inner like an inverted L. The cilia is mottled brown and fuscous.

Hindwing: whitish-brown, darker at apex; cilia white, with an outer and inner fuscous line; underside whitish, streaked with fuscous below costa, from base to apex.

Underside forewing: mottled white and fuscous, principally white below fold, costal dots repeated, cilia preceded by a white line and white dashes at veins 1*b* and 4.

Williams, Ariz.

Type in my collection; other specimens in U. S. Nat. Mus.

These specimens in the National Museum have been incorrectly identified as *E. invicta* Wlsm. While their general appearance is similar, they can easily be separated by the Indian-red head and palpi of *invicta*. Have thirteen specimens of the latter.

Eucosma palousana sp. nov.

Expanse 20–24 mm.

Head and thorax very pale ochre. Palpi same internally stained with fuscous on outsides; tuft on second joint long and loosely scaled, extending beyond apex below and concealing outer joint, except the extreme tip visible from above; length beyond head a little more than the thickness of head. Antennæ white, annulated with fuscous. Abdomen whitish, end of anal tuft stained with light fuscous. Legs pale ochreous.

Forewing: costa very slightly arched; apex shortly rounded; termen straight from 7 to 3; male costal fold, less than a quarter, narrow, appressed, scales roughened.

Color: very pale ochreous, with basal and dorsal spots and streaks on costa and in apical portion of a light brownish-ochreous. On dorsum, one quarter from base, a narrow fascia arises, continuing obliquely with parallel sides to upper edge of cell; the basal area enclosed is ground color, and beyond this semi-fascia is a broad band of ground color, outwardly defined on lower half by a brown spot on dorsum before angle, this spot is broadest on dorsum and has a hump above on its outer half, altogether about one-third of width of wing. The costal fold is brown, sprinkled with fuscous; the costa beyond fold is evenly marked with about fifteen light brown spots, the three or four before middle are short

oblique dashes; at the middle the dash continues obliquely to top of cell; in the outer third the streaks continue obliquely across the wing, the inner one to the anal angle, but very often broken; the second beyond this is enlarged into a flattened subapical spot, then continuing as a line into termen above angle; above and beyond this the streak before apex crosses to termen below apex. In the apex is a rather large spot, darker than any of the costal dashes. Ocellic patch illy defined; a rather large irregular area of shining ochreish scales, enclosing a brown spot, in the center of which are two dark brown dots, vertical to each other. The pale ground color is more or less strigulated with the darker shade of brown. Cilia ground color, heavily dotted with darker fuscous, with a whiter streak above middle, above and behind angle.

Hindwing: light smoky fuscous, cilia paler; underside same but lighter.

Underside forewing: light cinereous-fuscous, a large dark fuscous apical spot. Cilia dirty fuscous.

Five specimens; Pullman, Wash., July 11th, Aug. 10th, and Sept. 18th. One bearing label "Wash. Exp. Sta. No. 533; collected by C. V. Piper; and five specimens, Los Angeles, Cal., Aug. and Oct., "Through C. V. Riley." These last five are much more heavily overlaid with dark brown; they are also larger, the females expanding 24 mm. and males 20 mm.

Cotype in U. S. Nat. Mus.

Eucosma immaculana sp. nov.

Expanse, ♂, 26–28 mm.; ♀, 22–27 mm.

Head, palpi, thorax, forewings above, abdomen and legs very light ochreish, with a pinkish tinge. The pink shade is more intense on outside of palpi, front surfaces of anterior legs and around eyes. Palpi with rather long scales projecting in front of apex below, the point of which is only visible from above and projecting nearly twice thickness of head beyond it; very moderate crest on head.

Forewing: including cilia pale pinkish-ochraceous. Male costal fold narrow, appressed, about one-fifth length of wing, rather a darker shade of pink than balance of wing, with a narrow costal shade of ochreous, this streak extending almost to apex along extreme edge of costa. No marks, lines or dashes either on wing or costa.

Hindwing: light ochreish-fuscous, cilia bleached straw color.

Forewing beneath: shining light yellowish-fuscous, cilia paler and stained with pink at apex and below middle.

Underside hindwing: same color but a shade paler.

Four specimens: two male and three female; Pullman, Wash., Aug. 9th to 24th; collected by C. V. Piper. One specimen bears an extra label reading "Wash. Exp. Sta. No. 515."

Cotype in U. S. Nat. Mus.

The shape of the wings of this species and the general structural appearance is like *Eucosma crambitana* Wlsm., and I would place it in the list following the group with silver or white bars.

Eucosma johnsonana sp. nov.

Expanse 14–15 mm.

Head: with compact tuft between eyes and projecting forward, rounded on top, scales of moderate length; color dull ochre, suffused with pink back of and beneath eyes. Palpi with flattened compressed tuft on top largest about middle of second joints, thence rounded to outer joint, the tip of which is well exposed; color: salmon-pink, outer joint darker and tipped with ochre. Antennæ simple in male and female, grayish-fuscous, suffused with pink, annulations darker. Thorax and patagia salmon-pink, fading into ochreous posteriorly. Abdomen and legs pale ochreish, anterior tibia pink in front.

Forewing: costa nearly straight, very slightly and evenly arched, apex rounded, termen straight to 3, angle rounded, dorsum straight. Male costal fold little more than one-third length of ring, narrow, appressed. Pale ochreish, shaded with salmon-pink along costa, and a well-defined basal patch of this color. The basal patch of pink is most pronounced on dorsal half of wing and extends to beyond inner third, it is outwardly defined by a narrow band of very dark brown and black scales from dorsal margin to middle of wing, slightly oblique inwardly (*i. e.* nearer base at middle that at dorsum). A well-defined band of pink from base to apex on costa and extending down to upper vein of cell and following line of 7 into apex. A triangular shade of ochreish-pink is below this band in outer half; this shade is continued as a narrow line curving above ocellic spot and enlarging on termen, between apex and ocellic spot, into a smaller triangular spot. Ocellic spot large, rounded, occupying half width of wing; pale ochreish, crossed by three slightly shining, whitish, vertical lines, the outer curves inward at the top and there joins the inner. A few blackish scales on the lower ends of each of these lines, and a few scattered blackish scales above ocellic spot. Cilia very pale ochreish, with a double line of black scales from below apex to above anal angle. The costa is not marked with any distinct lines, but it as well as the whole of the wing is very faintly mottled with scales slightly darker or slightly lighter than the prevailing shades. In female specimens the blackish dorsal semi-fascia is broader and there are more separate black scales in the ocellic patch and above it.

Hindwing: whitish-fuscous, shading into smoky fuscous at apex and termen. Cilia white, preceded by a dark fuscous, then by a narrow whitish line.

Forewing: beneath fuscous, pink along costa, whitish below cell and 2, cilia gray.

Hindwing: beneath pale fuscous or light gray, cilia whitish.

Five specimens: one female, Seattle, Wash., red ink number 27; collected by O. B. Johnson; one female, Victoria, B. C., Rev. Geo. W. Taylor; one male and one female, Henry Edwards' collection, No. 14,720, and bearing small labels "3844 Nevada"; one male, Henry Edwards' collection, Vancouver Island.

Cotypes in U. S. Nat. Mus. and Amer. Mus. Nat. Hist.

Eucosma hopkinsana sp. nov.

Expanse 14.5–17 mm.

Head, palpi and thorax pale greenish. Head with flattened tuft or crown, above eyes and smaller tuft above face between base of antennæ; a few darker fuscous scales on top of head. Palpi: tufts flattened, compressed, moderate,

speckled with black, except on inner sides; outer joint half as long as second, exposed, dark at base. Antennæ slightly dentate, whitish-green, annulated with black. Thorax more of a solid pale green, patagia whitish green. Abdomen light fuscous, segments darker anteriorly, anal tuft cinereous. Legs light gray or pale fuscous, marked with blackish-brown on anterior tibia, annulations on anterior tarsi and a spot of same on posterior tibial tufts.

Forewing: costa slightly and evenly arched, male costal fold nearly half length of wing, moderate in width. Apex rounded, termen slightly concave between 3 and 7; dorsum slightly rounded. Color: whitish-gray, overlaid with shades and lines of pale green, fuscous and black. A median spot of black at base with green center; an oblique black dash on inner third of dorsum to middle, defining basal area, above it, obliquely inwardly, a shade of greenish fuscous, not reaching costa; a quadrate dark spot on dorsum before angle, this spot is slightly oblique, is outlined inwardly and outwardly with black, between these lines it is mottled green, whitish and gray. Between this spot and inner dorsal dash the ground color is paler and forms a light fascia on lower half, but not defined above middle. Costal fold marked with eight inwardly oblique short black dashes. Beyond fold, costa is marked with four quadrate dark spots, each outlined with black and greenish between the black lines, the third spot before apex sends an oblique black line into termen below apex, and an oblique line of the same color from inner spot obliquely to dorsal quadrate spot. A preciliate row of five greenish spots, each outwardly outlined with black. A cluster of green scales above dorsum in pale fascia between the two dark dorsal spots and a similar cluster above ocellic space. The ocellic spot is not defined. An obscure, inwardly-oblique, blackish shade from costa spot before apex towards quadrate spot on dorsum, ending abruptly at vein 7, and separated from the dorsal spot by ground color. In very strongly marked specimens, no doubt these spots may appear as a blackish, interrupted fascia. Dorsal margin marked with seven or eight spots of fuscous, greenish and black. Cilia long, gray, speckled with fuscous.

Hindwing: cinereous gray, darker at apex and before termen, cilia paler.

Forewing: beneath blackish-fuscous, streaked with gray along costa and termen, cilia gray, with five or six small round dark gray dots.

Underside hindwing: pale shining gray, cilia same. This description is principally from the female, in which the black lines and scales are the more pronounced than in the males, the black of the female is more of a dark fuscous, and there are more of the greenish scales scattered over the ground color. There seems to be no difference in the position and shape of spots, lines and fascia.

One male, one female: Hoquiam, Wash.; bred from *Picea sitchensis*; breeding labels "2119a. Hopk., U. S." and 40,370[1] Hopk. U. S.;" Burke, collector. The food plant label of the first bears an ? mark. One male, same locality and collector, labelled "July 21, 1904, flying."

Cotype in U. S. Nat. Mus.

Thiodia radiatana Wlsm. and allied species.

The little group of species, including *radiatana* Wlsm., *formosana* Clem., *ferruginana* Fern., and *aspidiscana* Hbn. have been hopelessly

mixed in every collection I have seen, which is partly accounted for by reason of the fact that the females are usually so unlike the males that it has been easier to refer them to another species than to associate them together. I have been successful in accumulating very long series of both sexes of each species, including four new species which are described below, and the following notes will doubtless be helpful in arranging them hereafter. For the purpose of comparison the males and females are treated under different heads.

T. radiatana Wlsm. ♂.—Forewing: whitish-fawn color, with a brown-ochreish streak from base to termen below apex, the veins beyond cell outlined with the same color, ocellus not well developed.

Hindwing: light fuscous-brown.

T. essexana Kearf. ♂.—Forewing: paler than *radiatana*, more of a bleached straw color, median brown streak darker, veins beyond cell not distinctly outlined with brown, ocellic spot well defined and encircled by brown.

Hindwing: gray fuscous.

T. umbrastriana Kearf. ♂.—Forewing: a shade darker than *radiatana*, median streak obscure, the entire outer third suffused with brown-ochreish, except the costal spot area, ocellus not strongly defined.

Hindwing: dark smoky brown.

T. roseoterminana Kearf. ♂.—Forewing: similar to *umbristriana*, but a paler brighter color, median streak nearly or quite obsolete, suffusion in outer third of a bright burnt-sienna shade, ocellus not distinct.

Hindwing: paler than *umbristriana*, or the same shade as *radiatana*.

T. awemeana Kearf. ♂.—Forewing: like a diminutive *distinctana*, but darker, median streak broader and to middle of wing only.

Hindwing: light fuscous brown, similar to *radiatana*.

T. ferruginana Fern. ♂.—Forewing: reddish-ochreous, paler at base. This is the smallest in both sexes of the series.

T. formosana Clem. ♂.—Forewing: inner two-thirds blackish-brown, outer third ochreous, costal metallic streaks do not connect with ocellus.

Hindwing: dark smoky brown.

T. aspidicana Hbn. ♂.—Forewing: similar to *formosana*, but less ochreous in outer third, and a strong metallic line from costa to inner metallic bar of ocellus. I have five European specimens of this species, the name of which has been so frequently applied to American specimens, I think erroneously, as I have never seen an American specimen having all of the characters common to the European.

T. radiatana Wlsm. ♀.—Forewing: brownish-ochreous, with the median streak of a darker brown, ocellus not distinct.

Hindwing: darker brown.

T. essexana Kearf. ♀.—Forewing: inner third brownish ochreous, outer third darker brown, ciliate edge gray, ocellus much more distinct than in *radiatana*.

Hindwing: reddish-brown, lighter and brighter than *radiatana*.

T. umbrastriana Kearf. ♀.—Forewing: lighter ochreous-brown than either of the above two, cilia ochreous.

Hindwing: as dark as *radiatana*.

T. roseoterminana Kearf. ♀.—Forewing: darker than *umbristriana*.

Hindwing: darker, cilia more ochreous.

T. awemeana Kearf. ♀.—Forewing: very much like ♂ *formosana*.

Hindwing: darker than any of the preceding, cilia whitish.

T. ferruginana Fern. ♀.—Forewing and hindwing: very little different from its male.

T. aspidiscana Hbn. ♀.—Forewing: like the male, hindwing much darker.

The most common mistake in identification has been to name all of the pale fawn or straw-colored males as *radiatana* and all of the reddish females as *ferruginana*, notwithstanding they are nearly double the size of the latter; and sometimes the females of *radiatana* have been named as female *formosana*. *Formosana*, in its turn, or, more frequently, the males, are usually named *aspidiscana*.

Thiodia essexana sp. nov.

♂.—Expanse 20–26 mm.

Head and palpi speckled gray, latter paler internally; thorax pale straw, with brown central and lateral streaks, patagia brown; antenna light grayish fuscous; abdomen fuscous, anal tuft paler; legs ochreous-gray, dusted with brown.

Forewing: bleached straw color, with a brown streak from base near dorsum to outer margin, it spreads there and circles the ocellus on its outer and lower edge, terminating in a large spot on dorsum before ocellus; from its outer end a spur goes up into apex. The ocellus is nearly round, and its pale straw color, well defined by the brown which surrounds it on all sides, except a small distance on its inner edge, where it connects with the same shade of the lower third of wing; the scales on the sides of the ocellic spot are slightly shining, and it is shaded with slightly darker scales over the veins which are beneath it. The outer two-fifths of costa contains three light brown dashes, outlined by paler, somewhat shining straw color lines, running together in a line parallel to costa, and concave above the ocellic spot. Cilia shining leaden-gray, with an internal line speckled fuscous and gray.

Hindwing: grayish-fuscous, darker around edges, cilia whitish-fuscous, with a dark basal line and a darker intermediate line; underside: ochreous-fuscous, dashes below costa and terminal line.

Underside forewing: coppery-fuscous, fawn along costa and gray along termen, straw color below fold.

♀.—Expanse 17–22 mm.

Forewing: brownish or dark reddish-ochreous, a slightly darker median shade from base running into the blackish-brown shade, which covers the outer third. Ocellic spot: of two curved bars of shining leaden scales, shaped as two halves of a circle but open top and bottom. Costal spots absent, but the boundary lines of shining leaden present, with a few scales of same color in middle of termen. Cilia dark brown and shining fuscous, preceded by a line of gray scales.

Hindwing: reddish- or Indian-brown, with a coppery reflection, darker around edges, cilia paler, with a darker basal line.

Twelve ♂ and six ♀ specimens, all collected near Caldwell, N. J. I have also bred this species from larvæ living in the main stem of *Aster patens* throughout the winter.*

Thiodia umbrastriana sp. nov.

♂.—Expanse 16–18 mm.

Head: pale fawn color, mixed with brown scales, thorax the same, with brown central and lateral lines, patagia paler; palpi gray, whitish internally; antenna pale fawn, darker at base; abdomen shining fuscous, anal tuft fawn; legs whitish-fawn, dusted with brown.

Forewing: light ochreous, straw color, with a diffused median streak of pale umber from base to outer third, where it joins the shade of the same color covering outer third of wing. The ocellus consists of a double bar of leaden scales, joined below in shape of U. The costal lines are not distinct as in the preceding species, and a streak of the ground color runs above the dark shade nearly to apex but towards its outer end becomes brown. Cilia ochreous-fuscous, preceded by a line of gray and black dots.

Hindwing: smoky fuscous, cilia whitish, preceded by a darker line; underside shining ochreous-white.

Underside forewing: brownish-ochreous, paler along costa and a darker shade in upper half of cell.

♀.—Expanse 16–18 mm.

Head: as in male but darker, and containing gray scales; palpi, thorax and legs darker.

Forewing: similar to male, but very much darker and more clouded with the umber color, which is not confined to outer third.

Hindwing: dark coppery smoky brown; cilia ochreous-brown, preceded by a darker line.

Eighteen ♂ and five ♀ specimens: Aweme, Man., June 9th to 22d, Criddle; Cincinnati, Ohio, May 23d to June 6th, Miss Braun; Beaver Co., Pa., F. A. Merrick.

Thiodia roseoterminana sp. nov.

♂.—Expanse 17.5–21 mm.

Head: grayish-brown; palpi gray, whitish internally; thorax pale fawn, darker in front and behind, patagia darker at base; antenna grayish-fuscous; abdomen yellowish-fuscous, tuft paler; legs pale fawn, dusted with darker.

* Recorded in Journal of New York Entomological Society, Vol. XI, Sept., 1903, p. 159, as *T. radiatana* owing to a wrong determination.

Forewing: inner two-thirds very pale whitish-fawn, median streak almost obsolete, outer third of a rosy-coppery hue; a shade of darker fawn below costa in outer third, in which the costal spots and lines are but faintly observable. The ocellus is nearly obsolete, a shade of fawn, hardly differing from the color around it, enclosed on both sides with faintly metallic bars, with a pinkish tinge. Cilia light pinkish-brown.

Hindwing: light smoky brown, cilia paler, preceded by a darker line; underside whitish-ochreous.

Underside forewing: pale ochreous-brown.

♀.—Expanse 16–19 mm.

Head and thorax reddish-brown; palpi dark gray, whitish internally; antenna and abdomen reddish-fuscous; legs ochreous, dusted with brown.

Forewing: very like female of *umbrastriana*, but of a brighter ochreous-red.

Hindwing: dark smoky brown; cilia ochreous, preceded by a darker line; underside reddish-ochreous.

Underside forewing: dark smoky ochreous-brown, paler along costa.

Twenty eight ♂ and twelve ♀ specimens: Cincinnati, Ohio, May 19th to 29th, Miss Braun; New Brighton, Beaver Co., Pa., May 18th to June 3d, F. A. Merrick; Wisconsin.

Thiodia awemeana sp. nov.

♂.—Expanse 17–19 mm.

Head: pale fawn, with ashy-gray scales in tuft above eyes and front; thorax pale fawn, with a blackish central and lateral line; patagia fuscous at base; palpi fuscous-gray, paler within; abdomen grayish-fuscous; legs fawn, dusted with brown.

Forewing: very pale fawn, median streak blackish brown, from base at dorsum to fold at middle of wing; outer third of wing, surrounding ocellic spot, dark brown, overlaid with black. Ocellic spot fawn, with metallic side bars, joined below; costal spots fawn, costal lines shining pale fawn, before apex a metallic line, becoming leaden below, parallels the termen to middle of wing. A shade of the dark outer color reaches costa before the costal lines and forms a narrow darker fascia to anal angle. Cilia blackish-fuscous, divided by a pale fawn line and a narrower pale basal line.

Hindwing: light brownish-fuscous, darker at apex; underside pale gray.

Underside forewing: grayish-brown, lighter on outer half of costa.

♀.—Expanse 17–19 mm.

Marked similar to male, but very much darker, not reddish as in the females of the three preceding species. The outer third is dark ochreous and dark brown, overlaid with black. The metallic leaden line from before apex joins the outer bar of ocellus. The light fawn of inner two-thirds is heavily overlaid with brown. Cilia blackish-fuscous; underside blackish-brown, ochreous-brown along costa.

Underside forewing: same as hindwing.

Eleven ♂ and two ♀ specimens: Aweme, Man., May 20th to June 29th, Norman Criddle; Beulah, Mann., A. J. Dennis.

Thiodia annetteana sp. nov.

Expanse 14–16 mm.

Head, palpi and thorax yellowish-fawn; antenna brown; abdomen light fuscous, legs whitish-yellow, dusted with fuscous.

Forewing: inner half dull yellow. The outer half is occupied by an elaborate ocellic spot, with metallic lines from costa. The ocellus is circular, filling the outer fourth of wing, on the lower half are two horizontal rows of square black spots, with a trace of a third line below, the upper half is brownish-fuscous, speckled with whitish scales. A silvery-metallic line in the form of a half circle bounds the upper half, it is interrupted at highest point, where a short metallic line from costa connects with the innerside; the outerside ends in middle of termen, where it nearly joins a vertical metallic line from apex. There is a vertical curved line on inner side of lower half of ocellus, and a shorter line on the outside, with a short one between the two middle pairs of black dots; the two former of these roughly form a complete circle around the ocellus. Beyond middle of costa a metallic line crosses the wing vertically, reaching nearly to dorsum, a similar but shorter line starts from costa behind the first one, but only reaches middle of wing; these two lines form the inner boundary of the ocellic ornamentation, between the lines and above the upper metallic circle the color is same as inner half of wing, but dotted heavily with gray along the edges. Cilia speckled fuscous and gray at base, outwardly shining gray; underside gilvery-gray.

Underside forewing: light coppery-brown, costal spots faintly repeated.

Seven specimens: Cincinnati, Ohio, April 2d to 23d, all collected by Miss Annette F. Braun, whose name will fittingly honor this dainty species. It is closely allied to *T. refusana* Walk., and closely resembles *Eucosma circulana* Hbn.

Thiodia asphodelana sp. nov.

Expanse 25–30 mm.

Head and palpi brownish-gray; antenna silvery-gray; thorax gray, finely speckled with fuscous; abdomen grayish-fuscous, tuft cinereous; legs gray, banded and dusted with fuscous.

Forewing: light brownish-fuscous, the outer half of the rather long overlapping scales ashy-white, giving the wing a frosted appearance. The white scales are not as abundant below the middle of the wing, causing a darker shade which crosses fold and ends before ocellus. The latter is high up in middle of termen and consists of two or three short vertical lines of irridescent scales, bounded on the outside by three black dots. The costal marks are obsolete, but below costa, above ocellus, are a few irridescent scales, arranged as would be the ends of oblique costal lines. On the border, below apex, is a short line of shining scales; terminal line brown; cilia whitish-fuscous, with a white line at base, followed by a darker line.

Hingwing: smoky brown, cilia white, with white followed by brown basal lines; underside the same, but a shade paler, and whitish along costa; underside very dark, smoky brown, whitish along costa and termen.

Four specimens: Durango, Colo., June 6th and July 2d, Dr. Dietz; South Utah, July, O. C. Poling; Calgary, Alberta, Head of

Pine Creek, July 2d, F. H. Wolley Dod, through Dr. Fletcher. This last specimen also bears label "Crambid fide Smith, Dup. of 36 to him Feb. 1900."

Thiodia baracana sp. nov.

Expanse 15–19 mm.

Head: light brown on sides, whitish-brown above and in front; palpi former shade outside, latter shade within; antenna creamy-white; thorax light brown, a spot of white on base of patagia, and a circle of white on posterior end; abdomen yellowish-white; legs yellowish-white, dusted with brown.

Forewing: basal area extending beyond fourth, outer edge vertical, straight, except one indentation below fold, mottled light brown, darker in outer half and edged with dark brown. It is followed by a broad white fascia, the inner half of which reaches costa; a third below it broadens horizontally, equaling the width of basal area, thence in a dentate line to dorsal margin. This is followed by a light brown fascia, well defined on lower two-thirds of wing; in the upper third it runs obliquely inward to costa, and on inner edge below costa sends a short line into the white at its narrowest part; there is a dot of raised black scales on its inner edge just above fold; the width of this brown fascia is equal to width of the white ocellic patch beyond, the latter is large, with straight vertical edges, and reaches to upper third of wing, it is dull white in the middle and shining white on the sides, between its upper half and termen is a wedge-shaped brown streak. The outer half of costa is marked with three brown spots, increasing in size outwardly and a fourth brown spot in apex, before the first and between each pair is a broader white spot, divided by a narrow brown oblique line. Between these costal spots and the upper edges of the brown and white fasciæ is a horizontal strigulation of gray and lilaceous-metallic lines. Antenna white, speckled with fuscous and brown on upper half.

Hindwing: light pinkish-gray, cilia white, with a darker basal line; underside the same.

Underside forewing: light smoky fuscous, costal spots repeated.

Six specimens: Stockton, Utah, Aug. 21st and Sept. 5th, Tom Spalding; Denver, Colo., Oslar; Colorado, Nos. 2133 and 2147, Gillette.

Cotype in U. S. Nat. Mus.

Thiodia caracana sp. nov.

Expanse 18–22 mm.

Head and palpi fawn-brown, latter paler within; antenna grayish-fuscous; thorax fawn-brown, with a patch of white on posterior end; thorax cinereous, tuft yellowish; legs whitish, banded and dusted with blackish-brown.

Forewing: brown, mottled with gray and white; two large square white dorsal spots, one in middle of wing, reaching to upper third, dentate on inner edge, an outer spur on fold from outer edge; the outer white spot is a little narrower than the inner and is in ocellic space, with straight vertical edges, it contains two or three black dots and a small patch of grayish scales, with a brown centre in upper part. The brown patch separating these white spots is dotted with white,

gray and black, especially black along the edges. Before the middle spot the outer half of the dark basal area is similarly dotted with black. The costa is marked with fine white lines its extire length, there are six in the basal area, four over the middle dorsal white spot, beyond these are four pairs of geminate white lines, becoming shining gray below costa and obliquely extending to the upper edges of the two outer dark and white dorsal patches, the gray streaks are on an obscure dark brown ground. The geminate streaks are separated by clear brown wedge-shaped streaks, the widest separating the outer geminate lines from a brown lunate apical spot, the latter is separated by the outer end of a costal line, with a similar brown streak between ocellic spot and termen. Cilia white at angle, with a fine marginal gray and brown line, which increases above middle and overspreads the cilia, becoming smoky black at apex.

Hindwing: light shining fuscous, cilia paler; underside the same on lower half, becoming much darker above.

Underside forewing: smoky brown, with white geminate costal spots.

Five specimens: Denver, Colo., Aug. 3d and 6th, A. J. Oslar; Stockton, Utah, June 29th, Tom Spalding; Pueblo, Colo., Aug., H. W. Nash.

Thiodia daracana sp. nov.

Expanse 16–18 mm.

Head: blackish-brown over eyes, cinereous above and in front; palpi grayish-brown; antenna and thorax fuscous; abdomen fuscous, anal tuft yellowish; legs brownish-white, dusted and banded with shades of darker brown.

Forewing: fuscous, heavily overlaid with white, giving a gray appearance. The white scales are closer together, forming an obscure fascia on lower half of wing beyond middle. The ocellic spot is white, with shining white scales on side, and two short superimposed horizontal black lines. Between middle and apex the costa is marked with five pairs of (geminate) lines, the three outer pairs run together beneath the subapical spot, sending a spur into termen beneath apex, below the costa these lines are slightly irridescent. The geminate lines are separated by darker fuscous-brown spots on costa, and there is a small triangular patch of the ground color, nearly free from white scale on dorsum below ocellus. Cilia gray, speckled with fuscous and with a narrow white outer line.

Hindwing: smoky brown, lighter above dorsal margin; underside grayish-fuscous, with a purplish reflection.

Underside forewing: fuscous, paler below.

Ten specimens: Placer Co., Cal., April 20th to May 1st, A. H. Vachell.

Thiodia raracana sp. nov.

Expanse 11–14 mm.

Head: cream-white, shaded with light brown on tufts above eyes; palpi cream-white, with a dot of fuscous at base and one at middle of second joint outside; antenna cream-white, shaded with fuscous in front; thorax salmon-pink, ochreous in front; abdomen fuscous, anal tuft pink; legs whitish, banded and dusted with brown and black.

Forewing: light reddish-ochreous in the brightest specimens to a reddish-fuscous in the darkest. The color is darker in the middle of the wing and palest below costa before middle and at apex. The ocellus is the most conspicuous marking, it reaches to middle of wing, and is as broad as high, cream-white in the middle, with vertical side bars shining white, on the dull white are two hori-

zontal black lines, sometimes joined at their outer ends and sometimes broken into dots, and occasionally with a dot or two below—the beginning of a third line. The costa is lightly marked with whitish oblique dashes, these beyond middle, five in number, are geminate, with faint leaden-metallic lines separating the two parts of each, from the middle one of the five a leaden line runs to similar shorter streak from spot before apex. The ground color between ocellus and these costal streaks is more ochraceous than pink. Cilia very pale fawn, becoming brown at apex and with a speckled row of gray at base.

Hindwing: shining grayish-fuscous, cilia the same; underside of both wings the same, forewing a shade darker.

Sixteen specimens: Montclair and Essex Co., N. J., Aug. 8th to 26th, with net and at light trap; Kentucky (Covington), Aug., A. Busck; Washington Co., Ark., July, A. J. Brown; Hastings, Fla., Oct., A. J. Brown. One specimen from U. S. Nat. Mus. labelled "Salidago, 11/884," and "From Glovers coll. 83."

Cotype in U. S. Nat. Mus.

This species has been incorrectly named as *Semasia ochreicostana* Wlsm. by Dr. Dyar, in my collection and others.

Proteopteryx laracana sp. nov.

Expanse 15–17.5 mm.

Head, palpi, antenna and thorax yellowish-gray, latter speckled with fuscous; abdomen and legs yellowish-gray, latter dusted and banded with dark brown.

Forewing: no male costal fold; shining whitish-gray, somewhat mottled with blackish-brown. There are two conspicuous blackish-brown characters, one a streak in middle of wing from base nearly to middle, the other a crescent-shaped fascia from middle of costa to middle of wing, then turning and running into apex. The basal streak widens below at about a quarter from base, and beyond its outer pointed end it sends a more or less obsolete fine line along fold to anal angle. The lower edge of the crescent mark reaches below middle of wing at outer third, its upper edge is dusted at the upward turn; in the gray area enclosed by the crescent, are four large brown costal spots and four fine brown lines. The inner third of costa is marked by three oblique brown lines. The dorsal edged from inner fourth to angle is marked with brown dots. In the darkest specimens the basal streak connects with the crescent, and the lobe on its lower side reaches to dorsum; the outer end of crescent is also enlarged and separated from the inner portion by a line of ground color. Cilia gray, preceded by two dark basal lines, a white dash below apex.

Hindwing: silvery-gray, cilia paler, underside the same.

Underside forewing: gray below middle, smoky brown above, costal marks repeated.

Thirteen specimens: Cincinnati, Ohio, March 27th to April 10th, Miss Braun; New Brighton, Pa., March 27th to April 15th, F. A. Merrick.

This is one of several species in Mr. Merrick's collection, incorrectly identified as *P. spoliana* Clem. by Dr. Dyar.

Proteopteryx maracana sp. nov.

Expanse 14–16.5 mm.

Head and palpi grayish-fuscous; antenna blackish; thorax black, patagia grayish-fuscous; abdomen blackish-fuscous; legs yellowish-white, heavily banded with blackish.

Forewing: without costal fold in the male, whitish-gray, with a well-defined basal area, outer fascia and spot in apex of black and brown. The basal patch is to inner fourth on costa and dorsum, and to inner third below middle of wing, above the middle the edge is lightly indented and irregular. There is a transverse shade of gray in the middle of the patch, defining a strong dentate dark process from middle of base. The dark fascia crosses wing between middle and outer third, its outer edge to anal angle, it is inwardly shaded with gray on upper fourth, with a black line on costa between the edges, a shade of brown crosses it at middle. The apical spot is an extension of the large costal spot before apex, it extends nearly to middle of wing in the shape of flattened triangle, with the long angle horizontal. Between the dark basal area and dark fascia is a grayish fascia, marked with two brown dashes on costa and a brownish-fuscous streak running through its middle to termen, enlarging into a brownish-yellow spot on lower half. The ocellus is yellowish-gray, containing a few black dots, the inner vertical bar is shining leaden, broad and large, the outer bar of the same color is narrower and shorter. Beyond the dark fascia the costa is marked with three large geminate grayish-white spots; that before apex sends a few whitish scales to termen below apex. Cilia gray inwardly, blackish outwardly.

Hindwing: light smoky brown, whitish above cell, cilia pale, with dark basal line; underside the same.

Underside forewing: smoky brown, costal spots repeated.

Seven specimens: Cincinnati, Ohio, March 26th to April 10th; all collected by Miss Annette F. Braun.

Proteopteryx haracana sp. nov.

Expanse 14–17 mm.

Head, palpi, antenna and thorax hoary, speckled blackish-brown; abdomen shining gray; legs whitish, banded and dusted with blackish.

Forewing: without costal fold in male; gray, with a smoky black streak from dorsum at base to apex, obliquely across wing. The inner part of this shade is the basal patch, which is only defined on lower half of wing, it is continued above middle by narrow angulated streak to apex. In one very dark specimen the black shade covers all of the lower two-thirds of wing, before the ocellus, with a few whitish scales, outwardly defining the basal patch. The costal third is gray, evenly spotted with blackish-brown, there are seven or eight large dashes and about as many fine lines. The ocellus is large, atomized white on dark ground, with four short horizontal short lines superimposed and a few dots of black below, the side bars are shining. Before the ocellus and in the apex are olivaceous shades. The apical spot is rounded, of an olivaceous shade, edged with black above, the black edging turning over and continuing as a black subterminal line as far as the incission. Cilia fuscous, speckled with black and white.

Hindwing: very light smoky gray, darker around termen, cilia paler, with darker basal line; underside shining light gray, dotted with fuscous on costa.

Underside forewing: smoky black, costal dots repeated.

Six specimens: Hunter's Range, Pike Co., Pa., May 1st; collected by Alfred E. Lister.

Proteopteryx faracana sp. nov.

Expanse 18–19 mm.

Head and palpi coppery-brown; antenna gray; thorax bronzy-gray, patagia streaked with white; abdomen gray, anal tuft light ochreous; legs whitish, dusted and banded with bronzy-black.

Forewing: no male costal fold, light bluish-gray, shaded with ochreous below costa at base. The basal area and other marks are bronzy-black. The basal area is strongest below middle, where its outer edge touches dorsum at inner fourth and outer end at inner third in middle of wing. The lower half between basal patch and ocellus is bronzy-black, crossed by two horizontal whitish-gray lines, one on the fold and the other half way between fold and dorsum. From inner fourth of wing a streak of bronzy-black parallels costa one-third below to before apex. Above this streak is bluish-gray, crossed at inner fourth, middle and outer third by dark lines from costa, which run into the dark streak below. Between these the costa is dotted with short dark dashes. The three dark costal dashes before apex send strigulated lines, the inner, in connection with the ocellic black dots, as a continuous line to anal angle, the middle one to middle of dorsum, the outer one curves under apex. The apical spot is black, with brown center. The ocellic spot is large, shining gray on the sides, dirty white in center, with a vertical line of black dots. Between the ocellus and termen is a narrow band of speckled gray and brown, increasing in width above middle and running into apical spot. Cilia shining leaden.

Hindwing: light grayish-brown, cilia whitish, with darker basal line; underside the same, mottled with fuscous along costa.

Underside forewing: smoky gray, whitish on costa and dotted with brown.

Two specimens: Scranton, Pa., April 21st and 22d, A. E. Lister. This may be a variety of *P. spoliana* Clem.

Proteopteryx albicapitana sp. nov.

Expanse, California specimens, 20 mm.; Pennsylvania specimen, 17 mm.

Head: with scales long and forming a flattened crest on top and in front, concealing basal joints of antennæ; the scales in front, on the sides of the head, around the eyes, the patagia and a narrow edging on each side of thorax are blackish-brown; from top of head to posterior end of thorax the scales are pure white. Palpi scarcely twice length of head, slightly depressed, flattened, lower edge of tuft in nearly a straight line from base to tip of outer joint, which is not quite hidden, but is obscured above more than below; scales above in a well-rounded hump. Color: outwardly dark brown, flecked with dark cinereous; within and above at base white, brown extending over the outer half of upper and lower edges and slightly encroaching on the paler color. Male antennæ slightly dentate, finely ciliated beneath, female antennæ simple, purplish-brown. Abdomen very pale brown or faded straw color, with a band of whitish scales on each segment. Legs same, annulated with brown. Abdomen of eastern specimen much darker, yellowish-fuscous.

Forewing: blackish- or dark purple-brown, excepting a pure white dorsal band about one-third width of middle of wing. This white band sends up into the ground color three spurs: first, at its beginning close to but not touching base; second, at inner third; and third, at outer third before ocellic spot. The white

spurs are rather acutely pointed, while the brown depressions between them are rounded. The white band is continued at anal angle through lower half of ocellic space and into cilia, which is pure white to the apex, excepting a dot of brown just below apex and on outer shade of brown in middle of wing. On the third white spur, just before ocellic space, is a large dot of brown scales, connected by scattering brown scales, with a similar but less conspicuous dot on dorsum. In eastern specimens these dark scales form a rather large triangular spot resting on dorsum and entirely interrupting the white band, excepting at its extreme upper edge. On extreme dorsal edge between this spot and base are twelve or fourteen rather evenly-spaced brown scales; two or three of the same are scattered over the upper ends of the first and second spurs. On the costa, between fold and apex, five or six geminated short dashes, these are almost obsolete on the western specimens. Costal fold about one-third length of wing, closely compressed, narrow; concolorous with upper part of wing, and bearing several geminate pale dots, which in the western specimens are reduced to tiny specks on extreme costal edge.

The dark color of the wing is more of a blackish-purple than brown, it is strigulated with short, fine, irregular, black, transverse lines, more distinct along costal and outer margins. Before the cilia a narrow line of more or less connected dark dots form a continuation of the line of dots on dorsal margin, and before this dark line on outer margin a narrow shade of the white continues up, nearly to apex, from the dorsal band.

Hindwing: light purplish-fuscous, cilia paler, with a lighter and darker line at its base; same beneath.

Underside forewing: purplish-brown, rather shining, costal and ciliate white spots repeated

Eight specimens: Nevada Co., Cal., Sept.; Kern Co., Cal., Oct.; Placer Co., Cal., Sept.; New Brighton, Pa., March 22d (F. A. Merrick).

Cotype in U. S. Nat. Mus.

The outer margin is very oblique, at an angle of about forty-five degrees from the dorsal line. In the California specimens the depression at end of veins 4 and 5 is barely observable, the margin being almost straight. The depression is more pronounced in the Pennsylvania specimen; apex rounded; costa scarcely arched; forewing three times as long as wide.

It is not impossible that fuller knowledge of the life histories of the western and eastern forms may prove them to be separate and distinct, in which case I would propose the name *pennsylvaniana* for the latter.

Proteoteras arizonæ sp. nov.

Expanse 18-20 mm.

Head, palpi, antenna and thorax cinereous-white; outer surface of palpi speckled with black, thorax speckled with fuscous, and posteriorly edged with black; abdomen whitish, shaded with light fuscous above; legs whitish, banded and dusted with blackish-brown.

Forewing: yellowish-white or dirty white, more or less mottled with brownish-black. The dark color forms a fascia from middle of costa to anal angle, beginning at costa as an extra wide oblique costal line to upper third, below this it widens and is darker, and from its upper outer edge sends a spur into apex; the latter just before reaching apex sends a line down to below middle of termen. The oblique fascia is divided into three spots, as below the middle it is interrupted by a roundish spot of whitish scales. The basal area is not distinctly defined, but that part of the wing is more strigulated with black than the space between it and the fascia. The costa, before the fascia, is lightly marked with black, beyond the fascia with four brownish-black spots, the outer one close to the apex. The ocellic spot is large, of silvery-white scales on sides, with a spot of dull white scales, containing grayish and brown dots in the center, it occupies all of the the space between and below the fascia and streaks from same. Cilia white, preceded by a geminate submarginal line on lower half, shaded with fuscous at lower third and below apex, becoming blackish-brown at apex.

♂.—Hindwing: black, cilia white, silvery-white below costa and yellowish hair pencil.

Underside both wings: yellowish-white, the costa of forewing and the outer half of both wings, except at termen, entirely overlaid with black scales. The upper side of hindwing and lower side of both wings of the females are grayish-fuscous.

Five males and two females: Prescott, Ariz., July 5th and 18th, Dr. Kunze; Oak Creek Canon, Ariz., 6000 ft. elevation, Aug., Prof. F. H. Snow; Pueblo, Colo., July, F. H. Nash; Cold Spring, Colo., Dr. Dietz; Fort Collins, Colo., June 24th, Gillette; Denver, Colo., Dyar and Caudell, No. 16,736.

Cotypes in U. S. Nat. Mus. and University of Kansas.

Proteoteras crescentana sp. nov.

Expanse 16–18 mm.

Head, palpi, thorax and base of antenna very light brownish-white; outer side of palpi shaded with black and apical joint the same color, base of patagia shaded with brown; abdomen grayish-fuscous, lateral tuft white; legs whitish, dusted and banded with black.

Forewing: light gray, with a very strong, well defined black crescent from middle of costa to apex, it is broadest between costa and the lower side of the curve, which is below middle of wing, from there to apex it tapers gradually ending in apex as a narrow line. The black basal area is well defined above the middle of wing, its outer edge starting from inner fifth and running to inner third at middle; below this, it is indistinctly angled inward to dorsum. On the upper half of wing, between basal and crescent dark patches, is a fascia of whitish scales, which follows the underside of crescent above fold, nearly into ocellic spot; it is strigulated by a line of dark fuscous scales. Beneath fold from base to angle is a streak of brownish-ochreous, and the semi-circular patch of ground color on outer half of costa, enclosed by crescent, is of the same color. The ocellic spot is large, of gray and white scales, the inner and outer edges are leaden-metallic. Between the outer edge of ocellus and apex and before the inner side of

ocellus are small patches of brown, the latter being a continuation of the dorsal brown streak. Cilia gray, speckled with fuscous.

Hindwing: light brown, the hair pencil-fold edged with black; underside the same.

Underside forewing: grayish-fuscous, creamy-white below fold.

The hindwing and underside of both wings are the same in male and female specimens.

Seven specimens: Iowa, Gillette, Ac. Cat., Nos. 36 and 46; West Manitoba; Kansas; Cincinnati, Ohio, June 17th, Miss Braun; Plummer's Island, Md., June, A. Busck; Elk Grove, Ill., June 25th, K. L. McElhose.

Cotypes in U. S. Nat. Mus. and Miss Braun's collection.

Prateoteras torontana sp. nov.

Expanse 20 mm.

Head, palpi and thorax light brown; outer joint of palpi darker brown; antenna gray; legs whitish-cinereous, dusted with brown.

Forewing: yellowish-gray, dusted with brown. A brown crescent-shaped streak from middle of costa to apex, enclosing a costal patch of pure white, the costa in this patch dotted with three large and five small brown dots. The brown crescent streak is broadest on costa, narrower on lower curve, and at the apex it broadens, involving all the space above the indentation of termen. The inner half of costa, before the crescent, is bordered also with pure white, in which there are about six brown dots on extreme edge, and a line of three or four below on upper edges of cell. Cilia brown at apex, white below.

Hindwing: cinereous, speckled with brown, narrowly shaded with dark brown at outer edge and base of cilia, outer ends of cilia whitish, light whitish-brown, with a pure white spot in apex, cut by a narrow submarginal dark brown line.

Underside forewing: smoky brown, dark brown at apex and narrowly at termen, white costal patches and brown costal dots repeated.

One specimen: Toronto, Ont., June 5th; collected by Arthur Gibson; received from Dr. Fletcher.

Proteoteras naracana sp. nov.

Expanse 16–20 mm.

Head: brown, lighter in front; face white; palpi white, shaded with black on outside and upper edge; antenna light brown, basal joint brown, with a white spot on posterior side; thorax white, with a pair of joined olivaceous spots on front and a patch of same color on posterior end, patagia white, with yellow and brown scales at base and near outer end; abdomen fuscous, lateral tufts on anal segment white, anal tuft fuscous; legs yellowish-white, banded and dusted with blackish-brown.

Forewing: a white streak from base to outer fifth on upper part of wing; its lower edge runs from middle of base, slightly above fold and parallel to it, nearly to middle of wing, then goes obliquely upward to costa at outer fifth, it is indented by a semi-circular depression at the beginning of the upward angle beyond which its lower edge is overlaid with gray, and is bounded by a horizontal

elongated S-shaped black mark that lies between it and the ocellus. The extreme costa is olivaceous-green, with a large green spot at inner third and middle, with smaller ones before, between and beyond. The lower part of wing is mottled olivaceous-green and brown. There is a cluster of long whitish scales on dorsum at base, above which is a spot of whitish and fuscous-brown raised scales, before this tuft are three black dots in a triangle; before fold is another round button of raised scales and a third tuft above fold on outer fourth. The ocellic spot is grayish-white, with shining white side bars. From costa, beyond white patch, is a whitish spot, which sends a leaden-metallic streak under apex. Between this and apex is another white spot on costa on an ochreous-brown ground. Cilia speckled black and gray at base, fuscous outwardly.

Hindwing: smoky brown, male hair pencil black, cilia gray, with dark basal line, underside paler.

Underside forewing: same as upperside hindwing, with costal spots repeated.

Ten specimens: New Brighton, Pa., May 31st to June 19th, F. A. Merrick; Cincinnati, Ohio, May 26th to June 4th, Miss Braun; Wisconsin, Otto Buchholz.

Epinotis septemberana sp. nov.

Expanse 16–19 mm.

Head: ferruginous on sides and front, grayish on top; palpi ferruginous, dark gray within; thorax ferruginous, gray, base of patagia dark ferruginous; antenna grayish beneath, ferruginous above; abdomen and legs yellowish-gray, latter banded and dusted with dark brown.

Forewing: gray on dorsal third, above purple-lake, the latter color paler at base and along edge of costa. The gray shade is finely atomized with blackish-fuscous and extends from base to termen a quarter above anal angle; from base to inner fifth there are only scattered gray scales on dorsal margin, at inner fifth it swells to middle of wing, at inner third it narrows obliquely along line of fold to outer fourth where it swells again, but less than before and rounds off into termen. The purple-lake ground color, in the indentation between the two gray elevations, is darker than elsewhere. There are a few scattered scales of gray in ground color above the second elevation. A fine, diminishing line of gray at termen from the anal angle to apex. Cilia purple-lake above middle, fuscous below and whitish opposite the gray color at angle.

Hindwing: smoky gray, cilia paler, with a darker basal line; underside the same.

Underside forewing: smoky brown, marked with cream color on costa and a reflection of purple-lake below.

Twenty specimens: nineteen taken in Essex County Park, N. J., the last week of September for a number of years; one from Scranton, Pa., September, A. E. Lister.

Epinotia haimbachiana sp. nov.

Expanse 13–17 mm.

Head: brownish-gray, darker back of eyes; eyes purplish-brown; palpi gray, slightly darker outwardly, apical joint white; antenna gray; thorax gray, ante-

rior edge speckled with brown, and a double brown dot behind middle; abdomen, first three segments and tuft pale ochreous, other segments fuscous; legs whitish, banded with blackish-brown.

Forewing: ashy-gray, with lines, spots and shades of brown. The basal area extends to inner third at middle of wing and to inner fourth of costa and dorsum, outwardly it is blackish-brown, especially intense below middle and on dorsum for the outer half of the area; above and before the intense brown color the balance of the area is gray, strigulated with brown. Beyond is a broad grayish-white fascia, outwardly defined by a narrow, nearly obsolete brown shade from middle of costa to anal angle, outwardly oblique to upper third, then inwardly oblique to lower third, thence concave to dorsum, where its inner edge ends in a small brown dot. The whitish middle fascia is more or less dotted with brown, and a faint line of same color parallels its inner border. Beyond the narrow dark fascia a broader streak of shining gray scales starts below costa at outer fourth, goes to anal angle, circles the ocellus beneath to termen. The ocellus is in the middle of the wing of fine whitish lines on dark brown ground, with six or eight black dots and horizontal dashes; there are several fine short black lines in the shining gray streak below the ocellus and a third below costa. The costa is whitish-gray, finely and regularly marked with short brown lines, with four larger spots in outer half, the inner of which sends a brown streak obliquely to middle of wing, the next one sends a brown streak to termen beneath apex, with a spur between termen and ocellus. There is a brown-black semi-circle in apex, the outer half on the cilia, through the middle of it runs a dark brown terminal line, this line in the middle of wing is nearly obsolete, with a white line beyond it, it continues as a brown line around anal angle. Cilia fuscous, brown outwardly at apex, and white inwardly in middle.

Hindwing: light bronzy-brown, paler at base, underside gray.

Underside forewing: smoky brown, with geminated whitish costal spots. Some of the female specimens are dotted with light reddish ochreous, on upper part of middle light fascia, and the two lower ends of the costal streaks on outer half are the same color.

Twenty-five specimens: Philadelphia, June 3d to 23d, Frank Haimbach; Cincinnati, Ohio, Aug. 14th, Miss Braun; Wisconsin, Dr. Nason; Riverton, N. J., E. Daecke. One specimen from U. S. National Museum bearing labels "Steganoptycha near *Saliciana* Clem., and approximating *pauperana* (Europe) but apparently distinct from both C. V. R. 1886" (Wlsm.), and a smaller label referring to the slight cocoon and pupa case "found on ground Augt. 4 iss. Augt. 7, 1877."

Cotypes in U. S. Nat. Mus.

This species is close to my *E. ilicifoliana*, bred from ilex in New Jersey and North Carolina. It is a generally larger and lighter species, and can be separated by the absence of the oblique brown line from end of cell to apex, which is always present in *ilicifoliana*.

Mr. Haimbach, in whose honor the species is named, has collected scores of specimens in the daytime resting on the fence of a summer garden at the corner of Allegheny Avenue and Broad Street. The garden is filled with many varieties of shrubs and trees, and a careful examination early in May would certainly disclose the larvæ twisting the young leaves of a plant allied to ilex.

The generic notes regarding *ilicifoliana* will also apply to this species. They are both allied to Clemens *saliciana* and *salicicolana*.

Epinotia plumbolineana sp. nov.

Expanse 13.5–16 mm.

Head, antennæ and palpi dark cream or very pale brown. Scales on head erect above and between eyes, flattened on face. Palpi second joint with flattened truncated tuft, scales rather closely appressed, end of third joint not hidden. Palpi rather depressed and not quite the length of head beyond it. Scales forming collar, tipped with reddish wine color. Thorax same as head, smooth. Abdomen alternately banded with cinereous and fuscous, the lighter color, the tips of scales of each segment, anal tuft cinereous. Legs same as head, but in front and tarsi stained with wine color.

Forewing: grayish-white, tinged with cinereous ground color. A conspicuous wide-red fascia from middle of costa to anal angle, broadest on costa and as wide there as one-third to one-half of width of wing, gradually tapering to an obtuse point at anal angle. The inner edge of this fascia curves evenly and obliquely outward, the outer edge is sinuate, slightly concave above and convex below the middle, the outer edge is outlined by a slender line of white lustrous scales from costa nearly to anal angle, turning inward above and defining the obtuse lower point of this fascia. Beyond this fascia the entire outer margin is clouded with this same color, but a shade paler, roughly in the form of a triangle with the base resting against the cilia, the other two sides coming to a point just beyond end of cell. Above this triangle the costa from fascia to apex is ground color. On the extreme apex are a few blackish scales, and in some of the darker specimens a few of these scales are scattered over fascia and triangle. There are no distinctly defined subapical costal spots, but four or five short streaks of more lustrous white can be observed in some specimens. A basal area is only well defined in some of the darker specimens, in these it covers the inner third of wing, angulated on cell and of a light shade of brown. In the majority of specimens this light brown basal color shades into the ground color, without very distinct line of demarcation. A few dark dots mark this area in some specimens, usually paralleling the fascia. The central fascia is narrowly edged with a whiter shade than the ground color. The male costa is slightly curled up from base to outer edge of fascia, and in the hollow thus formed is a narrow line of dark leaden scales, doubtless a secondary sexual character, this line begins just beyond base and ends in middle of fascia. Cilia lustrous pink.

Hindwing: dark gray, cilia paler, preceded by a darker, then a paler line.

Underside forewing: dark smoky fuscous, with cinereous line along costa from outer three-fifths to just before apex. Cilia stained with dull pink, preceded by a darker then a paler line.

Underside hindwing: same as above.

Twenty five specimens: one, No. 33, Seattle, Wash., O. B. Johnson; two, Seattle, Wash., v 27, 1902, T. Kincaid, blue label 179, and white labels "willow," whether caught on willow or bred from larvæ on willow not stated; twenty-two, Wellington, Br. Col., June, Rev. Geo. W. Taylor, and Th. Bryant.

Cotypes in U. S. Nat. Mus.

Cydia cupressana sp. nov.

Expanse 14–16 mm.

Head: dark greenish-brown, scales tipped with cinereous on the face the latter predominates, making face lighter, scales of head form semi-circular tuft above eyes, meeting above as a slight crest. Palpi very short, tip of outer joint scarcely projected beyond face, scales of second joint rather closely compressed, tuft small, colored same as face, outer joint black, bare, short, blunt. Thorax smooth, shining fuscous, patagia same, but scales shading into whitish at outer ends, neither irrorated with lighter specks like head. Abdomen and legs above shining fuscous, paler below, anal tuft tinged with ochreous.

Forewing: dark chocolate-brown, very finely irrorated with transverse lines, pale yellowish-green scales beyond basal area and crossed by five rather broad metallic lines, of a silvery-salmon hue; only the first pair of lines in middle of wing are continuous from costa to dorsal margin, the third ends just before reaching dorsal margin, the fifth is but little more than a costal streak ending at vein 8, the outer line before the outer margin is divided in three parts by two evenly spaced interruptions. A small metallic dot below costa between fifth line and apex. On the extreme costa the metallic scales are replaced by yellowish-green. The metallic lines are partly bound by black, notably: before the first, beyond the upper third of the streak, which black streak follows along costa to third line and down its inner side to top of cell; the lower half of this third line is defined on its inner edge by black, the black line at its upper end turns outwards, at right angle, cutting through the metallic line, and continues to the inner edge of the fifth metallic line, which it defines for the length of its middle section; in some specimens the horizontal black line is not continuous, and the line before the fifth metallic is also broken into two to four short horizontal dashes. Black also outwardly defines the fourth short line. The basal area is ground color, slightly shining, lightly and sparsely dusted with yellow-green atoms, it occupies nearly a third of the wing on dorsal margin, a quarter on costa, its outer margin oblique for two-thirds of its length, then vertical to dorsum. The metallic lines are nearly parallel to each other, the space between first and second is widest, the ground color between these two lines is also more heavily overlaid, with the pale atoms, the same is the case between third and fourth, and between fifth and apex; making an effect of three paler fasciæ, separated by two narrower darker fasciæ. Cilia luteous-metallic, preceded by a narrow brown-black line, the latter interrupted a third below apex by a small square yellowish-green spot.

Hindwing: deep smoky brown, cilia white, preceded by a brown line, and this by a faint narrow pale line; long hairs near base on veins 1 and lower median vein white.

Underside both wings: dull brown; underside forewing: costa marked with

pale yellow beneath the metallic lines above, the small pale spot on outer margin is also repeated, cilia shining brown. The cilia of hindwing is same as above, the tips of scales below outer half of costa and in apex are pale yellowish-green, giving the outer half of wing an irrorated appearance.

Described from ten specimens in the U. S. National Museum, bred from seed-pods of *Cupressus macrocarpa*, Alameda Co., Cal., issued Jan. 1 to 24, 1886, breeding number 68.

Cotypes in U. S. Nat. Mus.

Cydia piperana sp. nov.

Expanse, ♂ and ♀, 18.5 mm.

Head, palpi and thorax cinereous-gray, with atoms of paler gray. Abdomen and legs shining fuscous. Palpi porrect, ascending, second joint long, loosely clothed, third joint bare, extends beyond face.

Forewing: dull brown; closely, evenly and heavily overlaid with pale yellow atoms, these atoms not arranged in parallel transverse lines as in *cupressana*. Several metallic, silvery lines, with bluish reflections, cross the wing. One, just before the middle from costa to dorsum, nearly vertical, but slightly bulging outward about middle; the second, beyond middle, runs obliquely to dorsum before anal angle, and there joins a preciliate metallic line, the latter arising on costa at apex. Between second and outer lines are two short ones on costa, the outer is double the length of the inner, and is oblique. The metallic lines are narrowly edged with black. Cilia shining luteous, preceded by a narrow black line.

Hindwing: smoky fuscous, darker towards apex, cilia white, preceded by dark fuscous line, and it preceded by a very narrow whitish line.

Undersides both wings: shining fuscous, with a coppery reflection. Cilia same as above.

Two specimens: Pullman, Wash., April 11, 1898; collected by Mr. C. V. Piper, in whose honor the species is named.

Cotype in U. S. Nat. Mus.

Cydia inquilina sp. nov.

Expanse, ♀, 14–15 mm.

Head: shortly and loosely scaled in front and above, face small, cinereous, thickly dotted with fuscous or smoky brown. Palpi short, scarcely extend beyond head, second joint above with compressed scales, below loosely clothed with short scales hanging vertically downward, from end of second joint to base; outer joint as long as second, depressed, not hidden by tufts of second, closely clothed with short, compressed scales; pale cinereous, excepting all of third joint and a patch on outer sides of outer half of second, which are smoky black. Antennæ (female) simple, cinereous, lightly annulated with dashes between segments. Thorax smooth, it and patagia cinereous, thickly dotted with smoky brown. Abdomen dark fuscous, posterior edges each segment cinereous. Legs cinereous, annulated with smoky brown.

Forewing: smoky brown, tinged with ferruginous, minutely and thickly dotted with cinereous. A large patch of coppery-metallic scales in middle of wing below

costa, and a smaller vertical patch of same color before ocellic spot. A sinuate line of same color scales outlines outer side of ocellic spot, this line is interrupted in middle, and beyond the break on outer margin is a dot of same color. Several horizontal black streaks in ocellic spot. Costa from inner third to apex black, which is broken by six geminated cinereous dashes, about evenly spaced. Excepting the two apical pairs, these geminate dashes are heavily overlaid with bluish-metallic scales, most conspicuous in four short oblique lines at and beyond middle of wing, and an extended line from third spot before apex, which continues below the outer spots to outer margin about a quarter below apex. A narrow shade of ochreous-red or wine color from before middle covers upper part of wing below costa, turning downward at apex and ending on outer margin at anal angle. This reddish shade sharply contrasts with a black preciliate line on outer margin, and with the black and metallic streaks along the costa. In the apical third are a few short horizontal streaks of black. Cilia fuscous, with a shining purplish reflection.

Hindwing: smoky fuscous, paler basally, cilia pale fuscous, preceded by a broader, darker and a narrower paler line. Underside same.

Underside forewing: very dark, smoky, black; cilia same, preceded by slightly paler line; costal cinereous dashes faintly separated.

Three female specimens: two labelled "San Francisco, California, Mrs. Knickerbocker," and one red ink number 69, Seattle, Washington, O. B. Johnson.

Cotypes in U. S. Nat. Mus. and in my collection.

Ancylis intermediana sp. nov.

Expanse 12.5–14 mm.

Head, palpi, thorax and antennæ pale cinereous; palpi projecting two-thirds length of head before it, usually depressed, second joint heavily scaled, not compressed, entirely concealing third joint, sharply truncated at outer end. Scales of head long, forming small brush in front and ridge between eyes. Abdomen shining gray, anal tuft cinerous; legs cinereous, a sbade paler between joints.

Forewing: pale gray, overlaid with shining whitish scales = ground color. Large dorsal and other prominent spots olivaceous-brown = dark color. Large dorsal spots from base to anal angle on dorsum, upper edge from middle of base, swelling gently upward, reaching highest elevation at about inner third, where it is as wide as three-fifths the width of the wing, evenly rounded on top, thence descending, evenly without prominences towards anal angle, slightly sub-sinuate before angle; a continuous line of dark color is continued from anal angle as a preciliate line and merges into the dark color at apex. At the middle of costa an oblique fascia begins, but extends only two-thirds towards anal angle, and widens out into a well-defined lunate spot, the inner, lower and outer margins forming the curved portion; a falcate dark color spot in apex, preceded by eight short oblique dashes of same color on costa between apex and central fascia. These dark costal spots are separated by oblique lines of white lustrous scales, the lower points of each of the outer four are overlaid with lustrous blue, a few scales of same color beneath apex; the inner bounds the upper edges of lunate spot and runs into a line of bluish lustrous scales dividing this spot from the ocellic space; the next outer white line merges with the inner, the third and fifth are very

short and less than half the length of the fourth, sixth, seventh and eighth white lines. The first to sixth are outwardly oblique, the seventh vertical and eighth inwardly oblique. The dark costal dashes on each side of the sixth white line join together below and form a distinctly defined sinuate line, the outer edge of which rests on middle of outer margin. The inner boundary of this line is defined by a line of bluish lustrous scales, which also separates it from outer edge of ocellic patch. The pale ground color covers upper two-fifths of wing on costa before central fascia, thence descends in an easy sweep, with almost parallel edges between dorsal and lunate spots to the dorsum, then into and forming the ocellic space; a faint shade of darker scales crosses it on upper edge of cell, and in the ocellic space it is slightly overlaid with darker scales. The lunate spot at its outer end is cut by a short horizontal line of black scales, with a dot of same above the line. Cilia shining white, cut by a long black dash beneath apex and a shorter one below this, and margined inwardly by a row of black dots between apex and middle; below apex outer ends of cilia shaded with olivaceous-cinereous.

Hindwing: olivaceous-gray, cilia paler, preceded by a darker and a lighter line, the laiter the narrowest.

Underside both wings: shining fuscous, hind wing paler than forewing; cinereous along costa of fordwing, with darker spots repeated. Several dark dots on outer half of costa of hind wing. Cilia cinereous.

Nineteen specimens; male and female, one Seattle, Wash., O. B. Johnson, No. 51; eighteen, Wellington, Br., Col., Rev. Geo. W. Taylor and Th. Bryant, May and June.

Cotypes in U. S. Nat. Mus.

Enarmonia walsinghami sp. nov.

Expanse 15–20 mm.

Head: smoky brown; palpi light brown, darker on ends of scales and apical joint; antennæ fuscous; thorax bronzy-black; abdomen dark fuscous, anal tuft brownish-ochreous; legs light brownish-ochreous, annulated and dusted with blackish-brown.

Forewing: brownish-black, on the inner half of costa are seven or eight ochreous dots on the extreme edge, four larger and more prominent dots are on the outer half, but do not extend below the edge. The white dorsal patch is large and roughly triangular in shape, it extends to middle of wing on the dorsum, within the spot are two small black dots; there is a gray shade extending from upper end of the white patch to the costa before middle; a similar gray shade extends from the three inner costal marks; beyond the middle, to middle of cell and from the fourth, a pair of lines of the same color to the middle of the termen; between these gray shades and between the outer one and termen the ground color is overlaid with scattered black and ochreous-brown scales. The ocellus consists of a large U-shaped mark of gray-metallic scales, the lower rounded part resting on the termen above the angle, and the upper open and extending to beyond middle of wing. Cilia smoky brown, preceded by irregular darker line.

Hindwing: dark smoky brown; underside the same, but less dark cilia shining fuscous.

Underside forewing: same as hindwing, with ochreous costal marks and the white dorsal patch repeated.

Seven specimens: Hemlock Falls, N. J., April 29th; Essex Co., N. J., April 30th and May 4th; Great Notch, N. J., May 4th; Tryon, N. C., W. F. Fiske.

Cotype in U. S. Nat. Mus.

This is the eastern representative of the Californian *americana* Wlsm. Since the note published in Proc. U. S. Nat. Mus., xxviii, 362, 1905, I have received additional material which makes it very evident that the species are distinct. I take pleasure in dedicating the new form to Lord Walsingham, whose careful work on North American Tortricids is so well known and appreciated.

Enarmonia dyarana sp. nov.

Expanse, ♀, 16–17 mm.

Head: dark gray-brown, lighter in front; palpi light clay color, the long hair on the outer side of tufts fuscous; apical joint fuscous; antennæ blackish-fuscous; thorax blackish-fuscous, patagia of an olivaccous-fuscous shade; abdomen blackish-fuscous, anal tuft and underside anal segments whitish.

Forewing: blackish-brown, the outer fourth faintly irrorated with yellowish scales. On the costa before the middle is a pair of white dashes joining at top of cell and continuing to middle of cell as a dull leaden metallic line. Beyond the middle are four pairs of similar dashes, from all descend lines of metallic scales, that from the inner pair nearly joining the upper end of the dorsal mark. There is a small metallic spot on termen below apex; and beyond it, interrupting the black terminal line, is a patch of cream-colored scales. The ocellic spot is absent, but represented by a vertical bar of metallic scales starting from dorsum at anal angle and slightly curving inward to above middle of wing. The white dorsal mark arises from beyond middle of wing and inclines outward, it is composed of two white lines which come close together at middle of their length, and are separated at each end, they extend to above middle of wing, the scales at upper end metallic. Cilia shining fuscous.

Hindwing: smoky fuscous, cilia paler; underside the same.

Underside forewing: shining grayish-fuscous, with costal dashes as well as ocellic bar strongly reproduced in cream color, a dash of same through middle of cell.

Three ♀ specimens: Colorado, collected by Dyar and Caudell.

Cotypes in U. S. Nat. Mus. and my collection.

This species is roughly scaled and will go in the same class as *E. americana*.

Enarmonia edwardsiana sp. nov.

Expanse 12–14 mm.

Head and thorax blackish-brown; palpi pale clay-brown; antenna black; abdomen blackish-fuscous, external tips of scales on underside paler, anal tuft ochreous; legs whitish-gray, powdered with blackish-brown.

Forewing: brown, with a slight bronzy tinge; in the fresh specimen rather heavily streaked with gray from base to termen. On the costa below middle are two oblique white streaks, between them and base another white shade that does not extend below costa; beyond the middle are four pairs of white costal dashes, the inner one of the first pair giving off a short line of lilaceous metallic scales; the outer one of the second pair gives off a similar line, which runs beneath the third pair; the outer dash of the fourth pair continues as a broken line of metallic to termen beneath apex; these white dashes are separated by black interspaces. The ocellic spot is absent, being represented by a vertical bar of yellowish-gray metallic scales. The white dorsal streak is slightly beyond middle of wing and consists of two narrow oblique lines joined together at the top by metallic scales, and this extension reaching above middle of wing. Between the two lines on dorsum is a tiny white dot, a similar dot on dorsum before the first line; one or both of these dots are absent in some specimens. Cilia shining leaden, preceded by a black terminal line.

Hindwings: dark bronzy-brown, tuft of hair scales at base of median vein and cilia white. Underside whitish-bronze, mottled along costa with darker brown.

Underside forewing: same as hindwing, but outer half shinish reddish-bronze; costal spots strong, repeated.

Four specimens: three Henry Edwards' collection, Am. Mus. Nat. Hist., Reg. Nos. 14,564, 14,568, and 14,569, Coll. Nos. 236 and 235, California; one specimen, San Francisco, Cal.

Cotypes in U. S. Nat. Mus. and in my collection.

This species is similar to our eastern *E. tristrigana* Clem., but can be distinguished by the different dorsal marks. The three specimens from the Edwards' collection are somewhat faded, and are of a light cinnamon brown, the gray streaks absent, but the costal, ocellic, and dorsal marks agree with the fresher specimen.

Enarmonia lana sp. nov. Type in U.S.N.M.

Expanse 13 5-15 mm.

Head: fuscous, dark cream in front; palpi whitish, with a few dots on brown on outside of tufts; antennæ fuscous; thorax olivaceous-brown; abdomen purplish-fuscous, shining, outer ends of scales on underside whitish-fuscous; legs bronzy-brown.

Forewing: brownish-bronze, shining all over. There are two short oblique white dashes on costa before middle; beyond middle are eight white dashes, the inner pair geminate, and the six outer ones arranged in three pair, interspaces dark brown; from the inner dash and from the first pair, short lines of bluish-metallic scales parallel the costa; a short line of the same is below the eighth. There is a dot of the same in termen beneath apex. The ocellic spot is absent, but represented by a vertical bar of golden metallic scales reaching to middle of wing, between it and termen the ground color is overlaid with yellowish scales. The dorsal mark is broad and divided into four lines, they are somewhat contracted at the top, where they reach to the middle of the wing. Terminal line dark brown, cut below apex by a black streak, bordering which below is a white scale.

Hindwing: dark bronzy-brown, with a dash of whitish at base, cilia pale fuscous. Underside of both wings dark bronzy-brown, with costal dashes faintly repeated.

Two specimens: one ♂ and one ♀, Colfax, Placer Co., Cal, July, Collected by A. H. Vachell.

This species is also similar to the eastern *tristrigana*, but can be separated by the difference in costal and dorsal marks.

Enarmonia placerana sp. nov.

Expanse, ♂, 12–14 mm.; ♀, 14–16 mm.

Head: fuscous-brown, paler in front; palpi pale clay-brown, tips of brush and apical joint blackish-brown; antennæ black, with a bronzy tinge; thorax olivaceous-brown, patagia tipped with white; abdomen fuscous-brown, external scales, underside, white; thorax whitish-ochreous; legs cinereous-gray, powdered with fuscous.

Forewing: bronzy-brown, shaded with leaden gray on inner third on dorsal and costal margins of male. Before the middle of costa there are two white marks on extreme edge next to base, between these and middle are two white oblique dashes, the lower ends continuing as pale blue-metallic, and almost running into top of dorsal mark. Beyond middle are eight narrow oblique white dashes, the first sends a metallic-blue line obliquely across wing and joins the upper end of the vertical ocellic bar; from the fourth a metallic blue line runs parallel to costa and combines with a similar extension from the eight. The ocellus is represented by a vertical bar of silvery-gray metallic scales, the lower end resting on termen above anal angle, it curves slightly inward. The white dorsal patch is broad and divided into two lines by a line of brown, in some specimens each side line is subdivided by a central dotting of brown scales; it curves slightly outward, and in the ♀ specimens there is a tendency to broaden out at upper end, which reaches to middle of wing and terminates in a few metallic blue scales. Terminal line black, cut below apex by a dash of whitish-fuscous. Cilia leaden-fuscous.

Hindwing: dark bronzy-brown, cilia fuscous, underside both wings the same, with costal dashes repeated.

Three ♂ and four ♀ specimens: Placer Co., Cal., May to June; six collected by A. H. Vachell; one, collection of U. S. Nat. Mus.

This species is marked like *tristrigana*, but the shape of the wings and rather rough scales place it in the same class as *americana* Wlsm.

Enarmonia wana sp. nov.

Expanse 10–12 mm.

Head: gray, speckled with darker gray; palpi pale cinereous, upper end of tuft a shade darker, outer joint blackish; antenna gray, with darker annulations at joints, thorax bronzy-brown, with a reddish-green tinge; abdomen shining blackish-fuscous above, paler beneath, anal tuft whitish; legs whitish-gray, shining iridescent scales.

Forewing: shining bronzy-brown. Before the middle are three white costal dashes, the inner one nearly obsolete, each continuing to top of cell in lines of leaden-metallic. Beyond the middle are three pairs of white costal dashes, the two inner pairs close together, the outer close to the apex, all are continuous as

golden-metallic lines to a third below costa. The ocellic spot is olivaceous-yellow, crossed by four horizontal black lines; the vertical side-bars are golden-metallic, the inner one connecting with first costal line beyond middle. The dorsal white patch, which is divided by a brown dot on dorsum, about three times as long as wide, curving outward slightly and reaching but a trifle above fold; from the outer upper edge it is continued as a metallic line to above middle of wing approaching but not joining the metallic line from costal spot before middle. The tips of the scales on upper half to middle, in apex and before termen are tipped with yellow. There is a dark brown terminal line cut by a white dash below apex. Cilia shining fuscous.

Hindwing: bronzy-brown, paler towards base, cilia same inwardly, white outwardly; underside shining gray-white.

Underside forewing: shining bronzy-brown, with costal spots repeated. In certain lights there is a greenish bloom over both surfaces of both wings.

About fifty specimens: Carmel-by-the-Sea, Monterey Co., Cal., April; San Luis Obispo, Cal., March; all collected by A. H. Vachell.

Euarmonia zana sp. nov.

Expanse 10–15 mm.

Head and thorax grayish-brown; palpi pale clay color, ends of tuft and third joint blackish; antennæ fuscous-brown; abdomen blackish-fuscous, paler between joints, anal tuft ochreous; legs pale brown, heavily overlaid with black.

Forewing: bronzy-brown, with a metallic bloom in certain lights; the costa is marked with three obscure whitish spots before middle, from the outer two of which an obscure milky white shining fascia follows to middle then angles inward to dorsal margin. Beyond middle is a group of four white costal dots, obscurely geminate, the inner sends a line of shining silvery scales obliquely to middle thence down to dorsum, where it forms the inner bar of the ocellic spot; a short shining line from fourth spot joins the preceding at middle of wing. Before the apex are two hook-shaped white dashes, the outer one sending a broken line of shining scales to middle of termen; before these two dashes is an obscure white spot on costa, which sends a broken line of metallic scales to anal angle, the lower part forming the outer vertical bar of ocellus. The ocellus consists of a shining yellowish patch, divided by four short horizontal lines, these lines do not reach the side-bars, the outer bar is defined on its inner side by a broken row of black dots, with a few black dots on its outer side. The ground color of the outer half of the wing is heavily overlaid with golden-yellow scales. Cilia shining fuscous, preceded by a dark fuscous line.

Hindwing: rather light bronze, cilia pale gray, shining; underside brownish-gray, rather heavily reticulated with pale gray scales, especially at outer end of wing.

Underside forewing: upper half bronzy-brown, shading into a brownish gray below; costal spots repeated.

Twenty-four specimens: Wellington, Br. Col., May and June, Geo. W. Taylor and T. Bryant.

This species is similar to *E. vana*, but can be separated by the arrangement of costal spots and the ocellic spots.

Enarmonia vana sp. nov.

Expanse 13–15 mm.

Head and thorax dark gray, with a bronzy tinge, face pale yellowish gray; palpi yellowish-gray, with tips of scales and apical joint blackish; antennæ fuscous, finely annulated with yellowish-gray; abdomen blackish-fuscous above, cinereous beneath; legs whitish-cinereous, thickly powdered with dark brown.

Forewing: shining bronzy-brown; the strongest marked character is the ocellic spot, consisting of a patch of cream-colored scales, with a pinkish tinge and divided by four horizontal black lines; before and beyond this patch is a vertical bar of golden-metallic scales, also with a pinkish hue. The costa is marked by about six geminate cream-colored dashes; from the two pairs before the middle descend obliquely to top of cell obscure pinkish-metallic lines, which merge there, and an irregular and more or less obscure fascia of the same color reaches the dorsum at middle of wing. Beyond the middle the first and third pair of spots give off lines of pink-metallic, which approach each other about the middle of wing and nearly merge into the inner bar of the ocellic spot. A similar line curves outward from the second spot before apex, but ends before the termen; the dot before the apex gives forth a similar line, which runs into termen under the apex and causes a break in the black terminal line. The scales of the ground color of the outer half of wing are very faintly tipped with yellowish, giving a strigulated appearance. Cilia shining leaden.

Hindwing: light bronzy-brown, cilia same, with a leaden hue; underside same.

Underside forewing: darker than hindwing, costal spots strong, repeated.

Eight specimens: Colfax, Placer Co., Cal., July; collected by A. H. Vachell.

Enarmonia tana sp. nov.

Expanse, ♂, 12–13 mm.; ♀, 15–16 mm.

Head: olivaceous-gray, collar and face cinereous-gray; palpi cinereous, third joint blackish; antennæ fuscous; thorax olivaceous-gray, patagia streaked with whitish-gray; abdomen blackish-fuscous, with a few long white hairs from posterior segments; legs cinereous, dotted and annulated with dark brown.

Forewing: basal area dark leaden-gray, outwardly irrorated with yellow, followed by a broad cream-yellow central fascia, beyond which the leaden-gray ground color is heavily irrorated with vertical lines of creamy-yellow scales, except in the ocellic area, where the yellow lines are horizontal and separate the four horizontal black lines. From the outer third of costa is a wedge-shaped, cream-colored patch extending to middle of cell, and between its lower end and the central fascia is a smaller rectangular spot of the same color. This costal patch is marked on either side by a more intense yellow spot on costa, and is interrupted by one strong and one weak black costal dot; there is a similar black costal dot in central fascia. There are three transverse lines of shining leaden-metallic scales in the middle of the wing, two in the central fascia, the inner a little beyond the inner edge and extending only to middle of wing, the outer outlining this fascia, the third an equal distance beyond the second, its lower half forms the vertical inner bar of the ocellic space. There is a fourth line of the same scales from a broad white costal patch before apex to anal angle, interrupted twice, its lower half forms the outer vertical bar of the ocellic spot. There is a fine black terminal line, and the cilia is shining cinereous.

Hindwing: bronzy-brown, cilia white; underside brownish-fuscous, cilia gray.

Underside forewing: steely-brown, costal spot repeated, cilia shining leaden, preceded by a darker and lighter line.

Twenty specimens: Verdi, Nev., June 20th to 30th; Cisco and Colfax, Placer Co., Cal., June and July; all collected by A. H. Vachell.

Enarmonia vancouverana sp. nov.

Expanse 11–13 mm.

Head and thorax dark brown, nearly black; palpi cinereous; antennæ black; abdomen dark purplish-fuscous, tuft ochreous; legs dark gray, tarsi annulated with cinereous.

Forewing: bronzy-black, a grayish shade at base and less black and more reddish-brown at outer end. The costa is marked with four pairs of white, oblique dashes, from each pair a line of metallic-blue scales, none of them go below one-third the width of wing; opposite the end of the apical line is a tiny blue dot on termen below apex. The ocellic spot is absent, being represented only by the inner vertical bar of lilaceous scales. The white basal dash is narrow, slightly curved outwardly, does not reach to middle of wing. In some specimens it is divided by a line of ground color; in one, the two halves are joined together in the middle, leaving forked ends below and above. Terminal line black. Cilia shining fuscous.

Hindwing: bronzy-brown, underside grayish-brown, cilia fuscous.

Underside forewing: bronzy-brown, with costal spots repeated.

Ten specimens: Wellington, Br. Col., June, T. Bryant.

This very black species can hardly be mistaken for any other. I notice a small amount of variety in the costal marks of several of the specimens, there being an extra white dash between the third and fourth pairs.

Enarmonia saundersana sp. nov.

Expanse 10–12.5 mm.

Head and palpi: cinereous-gray; thorax and abdomen fuscous, latter cinereous beneath; legs cinereous, dusted with brown.

Forewing: bronzy-brown, shading to gray basally. Costa with ten rather long, oblique, wedge-shaped, whitish dashes, with blue continuations from first, second, fourth, seventh and tenth. The ocellic spot is nearly obsolete, being represented only by the vertical inner bar of lilaceous-metallic scales, narrowed, edged with black on the inner side and a few irregularly placed black dots between outer edge and termen. The dorsal mark is nearly obsolete, it consists of four faint whitish lines, with their upper ends converging and ending a little above middle of wing, the upper ends are overlaid with bluish-metallic scales. Termen line black, and a black dot in apex. Cilia shining fuscous.

Hindwing: bronzy-brown, cilia same as forewing.

Underside both wings: bronzy-gray, with costal spots repeated.

Four specimens: Toronto, Can., May 24th to June 11th; "On Lupin," H. S. Saunders.

Enarmonia fana sp. nov.

Expanse 7.5–10 mm.

Head and thorax in some lights like the grayish-blue bloom of a ripe plum, in other lights with a purplish-metallic reflection; palpi yellowish-white, outer joint darker; abdomen above same as thorax, beneath cinereous; legs cinereous, dusted with brown.

Forewing: bronzy-brown, but shaded with the plum-bloom in the inner fourth. On the costa are eight broad, oblique white lines divided by dark brown and extending to top of cell; from the first, third, sixth and eighth the lines are continued as pale metallic-blue. That from the third spot runs obliquely to and joins the inner metallic bar of the ocellic spot; that from the sixth spot goes towards but does not join the outer bar; the blue beneath the eighth is but a few scales. The ocellic area is large, filling the outer fourth of wing from anal angle to above middle; it consists of six black lines (the upper line is a row of dots, and the lower is short, with a spur angling downward), the vertical side-bars are shining lilaceous-metallic, the inner is double the width of the outer. In the middle of dorsal margin is a large white spot, in some specimens not divided, but in others divided by a line of brown, it is slightly inclined outward and reaches but a trifle above the fold, on its upper end the white is replaced by lilac-metallic scales which obscurely extend to middle of wing. The extreme edge of termen is brown, cilia shining leaden, with a white cut just below apex.

Hindwings and underside of both: bronzy-brown, shading to grayish-brown at base.

Ten specimens: Anglesea, N. J., May 15th to 30th; Essex County Park, N. J., May 15; Cincinnati, Ohio, Aug. 3d, Miss Braun.

Close to *interstinctana* Clem., *bracteatana* Fern. and *maculana* Fern.

Enarmonia angleseana sp. nov.

Expanse 10–11 mm.

Head above and thorax bronzy-gray, with a bluish reflection, face whitish-gray; palpi cream color, apical joint a shade darker; abdomen blackish-fuscous, with a purplish reflection above, a band of cream color on each segment below; legs whitish-cinereous, shaded with light brown.

Forewing: bronzy-brown, with a leaden shade at base. The outer three-fourths of costa is marked with nine rather broader lines; all, excepting the third, which is yellow, pure white; these white lines are unusually long, reaching to top of cell; from the first and second, which join together and separately from the fourth, seventh and ninth, are short lines of pale metallic-blue scales. The ninth outlines a large blackish-brown apical spot. In the ocellic space are five horizontal black lines, separated by four yellow lines, the latter are joined together inwardly, forming a vertical yellow bar; on either side the ocellus is enclosed by a bar of lilaceous-metallic scales, the inner bar being the broader and longer. Between this inner bar and middle of wing is a large shining yellow dorsal spot, composed of five or six vertical lines, reaching almost to middle of wing, the two outside lines are somewhat inclined towards each other at the top. Cilia shining, leaden-brown.

Hindwing: dark bronzy-brown, cilia grayish-brown; underside bronzy-brown, costal spots strongly repeated; over both wings is an irridescent sheen or bloom, when held at certain angles.

Forty-five specimens: Anglesea, N. J., from middle of May to end of June; one specimen, labelled "Mass.," from C. V. Riley collection, National Museum.

Cotypes in U. S. Nat. Mus.

Nearest to *interstinctana* Clem., but readily separated by the white dorsal mark of the latter. This species occurs in countless numbers in the shrubbery along Five-Mile Beach. At every step dozens rise and settle on the leaves of any convenient plant, where, for a moment or two, they strut around, very similar to the habits of the Choreutis.

Enarmonia dana sp. nov.

Expanse 12–13 mm.

Head: hoary-brown; palpi same, but cinereous at base; antenna gray, finely annulated with black; thorax hoary-brown, with an olivaceous tinge; abdomen fuscous, tuft cinereous; legs whitish-gray, dusted with brown.

Forewing: olivaceous-brown, eight or nine obscure whitish dots on costa, those beyond middle geminate; from each costal spot descends a line of pale blue, before the middle these are short, the two in the middle join a quarter below costa and send an oblique line to dorsum before the obsolete ocellic spot. The two spots beyond this blend and send a single line to termen below apex The apical part of wing is minutely dotted with yellow scales. There are four black dots on termen below middle, and the lines of blue scales are bordered inwardly with black dots. Cilia shining, leaden-brown.

Hindwing: smoky brown, cilia shining, leaden-brown.

Underside forewing and hindwing: shiny smoky brown, with costal spots faintly repeated.

Eight specimens: Montclair, N. J., May 24; Caldwell, N. J., May 17th and 22d; Wyoming Co., Pa., 2300 ft., June 17th.

Enarmonia dandana sp. nov.

Expanse 12 mm.

Head and palpi cinereous; antenna shining fuscous; thorax brownish-fuscous; abdomen dark fuscous, with a purplish reflection, anal tuft gray; legs whitish-gray, dusted with fuscous.

Forewing: smoky brown, in certain lights with a metallic sheen over the whole surface. Before the middle the costa is marked with closely set dots of obscure white, each terminating below in a few pale blue scales. Beyond the middle are five conspicuous geminate white spots. The inner one sends a line of blue obliquely to upper angle of cell; from the middle one a similar blue line goes to termen below apex. Above the anal angle and well before the termen are four horizontal black lines, enclosed before and behind by vertical bars of shining lilaceous scales. This ocellic spot is higher up and farther in than its usual position. A line of black scales lie between the two blue lines from costa. The

brown ground color is sparsely dotted with yellow scales on the inner two-thirds of wing and closely on the outer third. Cilia shining, leaden.

Hindwing: smoky brown, a shade paler at base, cilia gray, but tinged with brown at apex; underside smoky brown.

Hindwing: slightly lighter than forewing, the costal dots of the latter are faintly repeated.

Four specimens: Essex County Park, N. J., on hills back of Montclair, in light trap, Aug. 28th.

This species is much like *E. dana*, but can be readily separated by the strongly developed ocellic spot, which is entirely wanting in *dana*. I have male and female of both species.

Enarmonia garacana sp. nov.

Expanse 14–16 mm.

Head and palpi olivaceous-gray, outside of palpi blackish; antenna dark fuscous; thorax speckled fuscous-gray, posterior end fuscous, preceded by a whitish streak; abdomen fuscous; legs whitish, dusted and banded with brown.

Forewing: olivaceous-fuscous, with three broad geminate whitish fasciæ from costa to middle of wing. On costa beyond middle are four shorter whitish geminate spots and a white dash before apex. Between dorsum and fold are two whitish patches, each divided by a darker line, one at inner fourth and one in middle. From the outer third of costa a bluish-metallic line crosses wing to anal angle, where it ends in a white dash in cilia, a similar metallic line from costal spot before apex ends as a white dash in cilia at middle of dorsum. Ocellic spot obsolete, consisting of a few scattered metallic scales. Termen edged with a fine black line. Cilia leaden-gray.

Hindwing: bronzy-brown, cilia whitish, with a darker basal line; underside grayish.

Underside forewing: smoky brown.

Four specimens: Chicago, Ill., July, J. H. Reading; Trenton, Ontario, J. D. Evans.

Sparganothis taracana sp. nov.

Expanse 13.5–20 mm.

Head and palpi reddish-ochreous, latter paler within; thorax dark ochreous, patagia purplish-ochreous; antenna pale ochreous, shaded with purplish towards base; abdomen ochreous; legs whitish, with an ochreous reflection, dusted with pink and purplish-ochreous.

Forewing: pale ochreous, or light canary-yellow, under a lens the extreme tips of each scale has a bluish-irridescent reflection. The extreme base is pinkish-purple, this dark shade extends along costal and dorsal margins to inner sixth. There is a narrow fascia of the same color across middle of wing, interrupted in the middle of the cell, it is slightly farther away from base at dorsal than at costal margin. There is a narrow subterminal fascia of the same color between veins 2 and 7, broadest in the middle. At outer fourth of costa there is a faint shade of the same color. There are four specimens with the middle fascia. I have thirteen which I consider the same species, in which the middle fascia is

obsolete, being indicated on extreme costal edge by a faint shade. Cilia opposite the yellow are concolorous, opposite the purplish the dark color overruns the cilia at base, but extreme edge is yellow.

Hindwings: very light pinkish straw color; underside pale ochreous, streaked with darker ochreous below costa and in middle of wing.

Underside forewing: ochreous, shaded with pinkish, the central and terminal fasciæ are lightly repeated.

Seventeen specimens: Hastings, Fla., March, April, Sept., Oct., and Nov., A. J. Brown ; Burnet Co., Texas, F. G. Schaupp.

The varieties with and without the central fascia occur in both the spring and fall and in both Florida and Texas.

Sparganothis yumana sp. nov.

Expanse, ♂, 14 mm.; ♀, 16 mm.

Head, palpi, thorax, abdomen and forewing light ochreous in the male, and dark ochreous in the female. In the latter there are a few dark scales between lower vein of cell near its outer end and fold, and an almost invisible narrow darker shade from outer third of dorsum to middle of costa. Cilia concolorous.

Hindwing of male same color as forewing; of female, light ochreous, darker around the edges; underside both wings light ochreous in male, darker in female.

One ♂ and one ♀: Yuma Co., Ariz., desert; received through J. B. Smith.

Sparganothis bistriata sp. nov.

Expanse 22–24 mm.

Head and palpi yellow, darker outwardly ; thorax yellow, patagia dark ochreous at base and apex; antenna pale yellow ; abdomen and legs dirty yellow, latter banded and dusted with purplish-red.

Forewing: bright canary-yellow, strigulated with vertical lines of shining opalescent scales, in a general way following the curve of the termen; these bright lines cross wing from base to termen, and each forms a shining spot on costa. There is a costal line of bright red from base to outer sixth, a similar band through middle of cell from base to end of cell, a slight shade of the same color on dorsum at outer end of fold. Cilia yellow.

Hindwing: above and below pink or dark flesh color, cilia whitish.

Underside forewing: ochreous, shaded with pink through middle of wing, and red on and below costa.

Three specimens: Shovel Mountain, Burnett Co., Texas, F. G. Shaupp; Florida.

Sparganothis tristriata sp. nov.

Expanse 17–23 mm.

Head and palpi: dark ochreous; antenna purplish-fuscous; thorax dark ochreous, patagia wide-red ; abdomen light fuscous, anal tuft light brown ; legs whitish, powdered with reddish-brown.

Forewing: light canary-yellow, with three wine-red streaks from base to termen. The upper edges, the costa, the middle is above the middle of the wing, and the lower one on dorsum between it and fold, the last is shaded with yellow

along dorsum for inner third. There is a lighter subterminal shade of the same color which joins the outer ends of the three streaks together. The two yellow interspaces are about of equal width to the red streaks. As in *bistriata* there are vertical strigulations of shining irridescent scales, they are more conspicuous on the red streaks, and in the inner part of wing are nearly obsolete on the yellow shades. Cilia yellowish at apex, becoming pinkish at anal angle.

Hindwing: purplish-fuscous, cilia paler; underside gray, with a purplish tinge.

Underside forewing: ochreish-purple, narrowly ochreish along costa, and paler beneath fold.

Five specimens: Duluth, Minn., from C. H. Fernald's collection; Plummer's Island, Md., Sept. 13th, A. Busck. The Maryland specimen is 23 mm., while all of the Minnesota specimens are 5 to 6 mm. smaller.

Cotypes in U. S. Nat. Mus. and Prof. Fernald's collection.

Both this species and the preceding are allied to *S. striata* Wlsm.

Cenopis saracana sp. nov.

Expanse, ♂, 19 mm.; ♀, 20 and 23 mm.

Head, palpi, antenna, thorax and forewing light fawn-brown or light terra cotta; abdomen whitish-fawn, anal tuft light fawn; legs whitish, dusted with dark fawn.

Forewing: light fawn, spotted with dark purplish-fawn. At the extreme base is a shade of the dark color. On the costa at inner third a roughly triangular dark spot; at the outer fourth is a larger darker spot, connecting with a smaller spot in middle of wing, which also connects with a large triangular spot on dorsum at outer third; the three spots with their connecting lines forming an inwardly oblique fascia. The dark markings of the female specimens are larger and more abundant than of the male, the spots of the outer fascia are broader and there is a small dark spot on inner fourth of dorsum in line with the axis of the costal spot above it; there is also a fine strigulation of dark dots on costa between fascia and apex, the outer row of which extends to middle of termen. The forewing of both sexes is strigulated with vertical rows of irridescent dots, of a silvery-bluish hue.

Hindwing: light reddish-terra cotta, white above cell; underside very light fawn, without the reddish hue.

Underside forewing: light yellowish-fawn around the edges, brownish-fawn in middle.

One ♂ and two ♀: Essex County Park, N. J., on hills above Montclair; two flown specimens, July, one bred from larva twisting the leaves of common sassafras; larva found June 13th, moth issued July 6th.

Cenopis karacana sp. nov.

Expanse 18 mm.

Head, palpi and thorax light yellowish-fawn; antenna grayish-terra cotta; abdomen and legs whitish-terra cotta, latter dusted with brown.

Forewing: light yellow, strigulated with vertical rows of shining whitish scales

and marked with light purple spots. The male costal fold, which is very short, and a small shade at extreme base are purple. There is a narrow purple fascia from inner fourth of costa to middle of dorsum, widest on costa and hardly more than a line on lower half. A purple triangular spot on outer third of costa in one specimen sends a fine line to lower third of wing, pointing to anal angle, and two or three small dark dots on costa between the spot and apex.

Hindwing: above and below whitish fawn, cilia the same.

Underside forewing: yellow along costa and termen, white below fold, interior light pinkish-brown.

Two male specimens: one bred from larva crumpling the leaves of bayberry, Anglesea, N. J., June 14th, issued July 9th; breeding No. K. 367; one from larva rolling the leaves of black oak, Essex County Park, N. J., May 30th, issued June 29th; breeding No. K. 224. I have the following notes on the larva of K. 224: "Rolls side of leaf into a tight cylinder; length 12 mm., pale yellow, lighter subdorsal lines on which are tubucules 1 and 2; annulate subspiracular line also lighter. Head jet black, whitish collar separates P. T. shield, which is jet black and large, covering all dorsal area. A long tubecular plate below shield and before spiracle, also a smaller spot at base of leg, jet black. Anal shield nearly round, concolorous with skin, but slightly shining."

Archips brauniana sp. nov.

Expanse 19–22 mm.

Head, palpi, thorax and abdomen brownish-gray, with a darker collar between head and thorax; antenna whitish-gray, annulated above with darker gray; legs whitish-gray, powdered with fuscous.

Forewing: shades of light and dark gray, with three velvety brown spots, forming an oblique fascia from base of dorsal margin to costa at outer third. The ground color is whitish-gray, finely and closely dotted with a darker gray, and slightly lighter on outer end of wing. The male costal fold, which is broad and long, is dark gray. At inner eighth of dorsal margin is a narrow velvety dark brown fascia to middle of wing at inner third, separated from it by a gray shade is a large flattened oblong spot extending from upper edge of cell at middle to anal angle, only the upper edge of this spot is dark brown, all of the lower part being a light grayish-brown; from the dark brown upper part a spur is sent outward. A similar dark brown spot on costa at outer third is separated from the middle spot by leaden-gray shade, edged with whitish gray, this costal spot is twice as long on costa as its vertical thickness, and its lower edge is rounded; from the outer edge of this spot a streak of lighter brown runs into termen at lower third, between this latter and the middle spot is an ovate spot of leaden-gray. There is a black dot in costa before apex and one on termen just below apex, and a broken line of black scales below the latter. Cilia concolorous.

Hindwing: smoky gray, whitish above cell, cilia whitish, with a dark basal line. Underside both wings gray, forewing darker.

Seven specimens: Cincinnati, Ohio, June 15th and 17th, Miss Annette F. Braun; New Brighton, Pa., June 22d, F. A. Merrick.

This species will come next to *Archips grisea* Rob., which its color scheme resembles.

Pandemis pyrusana sp. nov.

Expanse, ♂, 22 mm.; ♀, 26 mm.

Head, palpi and thorax light brown, outer joint of palpi and antenna fuscous-brown; abdomen white, anal tuft and legs yellowish-white, latter powdered with brown.

Forewing: light ochreous-brown, with the usual fascia of this genus of a darker shade. The basal area is defined by a nearly obsolete line from costal fourth to dorsal third, this line is outwardly oblique to a third below costa, between which and dorsum it strongly curved inward; between it and the base are more or less obsolete parallel strigulations. The middle fascia, from middle of costa to before anal angle, is constricted above upper fourth, below which it broadens out and the sides are parallel. The outer costal spot begins at outer third, is semi-ovate, with outer end pointed and nearly reaching apex. The dorsal margin is dusted with blackish-fuscous scales, and this dark shade extends up nearly to middle of wing on the inner half of middle fascia, and slightly above dorsum on the inside of basal line, the dark shade extends around the anal angle into the termen to the apex, overflowing on to the cilia which is of the same color. There is a slight dusting of this dark shade on inner fourth of costa.

Hindwing: shining white, becoming yellowish-brown at apex and with a yellowish subterminal shade, cilia white; underside the same, but the yellowish-brown extends further into the wing.

Underside forewing: light yellowish-brown, or terra cotta, slightly darker below costa on inner half and at termen, cilia blackish-fuscous. In the female the dark shade is not so distinct on dorsal margin, and does not overspread the fascia.

Three specimens: Alameda Co., Cal., Sept., larva on leaves of apple; Alameda Co., Cal., June; Los Angeles Co., Cal., Coquillett.

Cotype in U. S. Nat. Mus.

Tortrix kukakana sp. nov.

Expanse 24 mm.

Head, palpi, antenna and thorax light brown; abdomen light brown, white on first segment and lateral scales on first to third segments; legs light brown, banded and dusted with dark brown.

Forewing: clay-yellow or very light brown, vertically strigulated with dark brown. These strigulations concentrate and form a middle fascia and costal spot before apex. The inner edge of fascia is from inner third of costa to three-fifths on dorsum, the outer edge from middle of costa to dorsum just before angle, the outer line is obscurely defined below. Cilia whitish, tipped with dark brown.

Hindwing: white, speckled with fuscous along dorsal margin, and less heavily along termen, with some scales of same color all over the wing, underside the same, cilia white.

Underside forewing: same as upper side, with dark strigulations repeated, but the fascia and costal spot obsolete.

Two specimens: Kukak Bay, Alaska, July 1, 1899, Harriman Expedition, '99, T. Kincaid, collector.

Cotype in U. S. Nat. Mus.

Tortrix nervosana sp. nov.

Expanse 20–22 mm.

Head, palpi, thorax and antenna light buff-brown; abdomen grayish-fuscous, anal tuft creamy-white; legs creamy-white, dusted with brown.

Forewing: light brassy-brown; all veins, especially strong beyond cell, overlaid with fuscous. Cilia concolorous.

Hindwing: grayish-white, darker above dorsum, cilia whitish; upperside cream color.

Underside forewing: smoky or brownish gray, dull ochreous at extreme edge of costa and along termen, cilia whitish.

Three specimens: Winchenden, Mass., July 5th and Aug. 7th, F. A. Merrick; Scranton, Pa., June 17th, A. E. Lister.

This species is of the shape and general appearance of *T. pallorana* Rob., and may prove to be a variety of it, but can easily be separated by the veins being overlaid with a darker shade.

Tortrix seminolana sp. nov.

Expanse 19–22 mm.

Head and palpi: yellowish-brown, with the outer ends of the scales and outside of palpi reddish-brown; antenna and thorax reddish-brown; abdomen and legs yellowish-brown, the latter dusted with reddish-brown.

Forewing: shining yellowish-brown, finely strigulated with non-shining lines of the same color, towards the costa in inner third the yellowish-brown strigulations alternate with reddish-brown. A central fascia, which is nearly obsolete, except at costa and dorsum, obliquely cross wing from middle of costa to dorsum before angle, it is widest below. The fascia is reddish-brown, overlaid on upper fourth with dark leaden-fuscous scales; there are a few scales of the same color above dorsum. The reddish-brown triangular spot on costa before apex is small and also contains a few leaden scales. Cilia dull reddish-brown.

Hindwing: clay-yellow, cilia paler; underside the same.

Underside forewing: very light golden-brown, with a few darker brown scales on costa near base, and a pinkish-brown shade in middle of wing. In some specimens the leaden scales are not present.

Eight specimens: all collected by Wm. Beutenmüller in Florida.

Tortrix cockerellana sp. nov.

Expanse 21–24 mm.

Head: pale yellowish-fawn, whitish within; antenna light fawn, basal joint darker; thorax light fawn, posterior tuft and outer end of patagia white; abdomen yellowish-white, anal tuft light fawn; legs whitish, heavily banded with dark brown and fawn.

Forewing: light fawn, rather evenly mottled with shining whitish spots in oblique lines. There are ten of the spots on costa between base and apex, the

spots reaching to top of cell; there are three to four rows of horizontal spots beneath the costal spots. The spots are separated by the light fawn ground color, which forms irregular oblique lines. There is a line of black scales from middle of wing in upper third of cell and passing through the end of it between veins 6 and 7, it stops before termen and the black scales on the outer end are more scattered; within the cell, above the black line, are two long and narrow pure white shining spots, the black line rounding the lower edge of each, outside the cell is a similar white spot below the black line, with a short spur of black around the outer edge. There are a few scattered black scales in the fold between inner fifth and dorsum. Cilia shining, whitish-fawn.

Hindwing: above and below pure white, with a few light fuscous scales below costa.

Underside forewing: whitish-fawn, with a pink or flesh-color tinge, paler along costa.

Eight specimens: Glenwood Springs, Colo., Aug. and Sept., received from Dr. Dietz, but probably collected by Dr. Barnes; one specimen, U. S. Nat. Mus., "Colo. 2758"; Lamy, New Mexico, Sept. 17th, Cockerell, No. 5642.

Types in U. S. Nat. Mus.

The appearance of this insect is somewhat like *T. houstonana* Grote.

Tortrix chiococana sp. nov.

Expanse 12–14 mm.

Head: golden-brown and ferruginous; palpi light brown, outer end of tuft on outside shaded with ferruginous; antenna light brown beneath, annulated with ferruginous above; thorax golden brown and ferruginous, patagia darker; abdomen and legs pale ochreish, latter dusted with brown.

Forewing: golden-brown, with the scales frequently tipped with ferruginous and mottled with light fawn. The most conspicuous markings are on costa in upper third of wing; before the middle of costa is a large Indian-red spot, curved on under side, which reaches one-third below costa, in it are two vertical light plum color costal spots; close to base is a smaller Indian-red spot, with a plum color center; between these two is a spot of shining pale fawn, divided by a faint ferruginous line; a similar pale fawn spot is beyond the larger red spot; these two light spots continue as fascia to dorsal margin; beyond this is a wider but narrower Indian-red spot with two faint costal yellowish dots, beyond this and into apex the color is pale yellowish-fawn. In the outer end of wing beyond cell are three or four vertical lines of shining scales, whitish, with a faint lilaceous tinge; in the upper half of this space, between the shining lines, is a deeper red shade, in which are tiny dots or buttons of raised scales. Cilia shining pink, pale ochreish at apex.

Hindwing: cream color within, coppery around margins, cilia the same shade, but shining; underside coppery.

Underside forewing: light coppery-brown.

Four specimens: Palm Beach, Fla., bred by Dr. Dyar from larvæ webbing the leaves of *Chiococca racemosa*; record Nos. 15,485, 15,615, and 15,619.

Cotypes in U. S. Nat. Mus.

This species was determined as *Cacoecia georgiana* Walk., with a query, by Prof. Fernald, for Dr. Dyar's paper on "Notes on the Winter Lepidoptera of Cape Worth, Fla.," Ent. Soc. Wash., Vol. IV, p. 466, 1901.

Tortrix albicomana Clem., and varieties.

I have a large series of fifty or more specimens of this species, and find they separate very nicely into four well-defined varieties, with practically no connecting links. Clemen's type, which is well preserved in the Academy of Natural Sciences, Philadelphia, is of the pale lemon-yellow and ochreous form, with only a trace of the ferruginous shading. I have already described, in Can. Ent., XXXVII, p. 9, 1905, as var. *semipurpurana*, the form in which all of the forewing is very dark purple, except a narrow basal area, a narrow band around termen and apex, and a costal spot of yellow, and now propose the following names to identify the other two varieties.

dorsipurpurana var. nov.

Like type, excepting the extreme dorsal edge is stained with dark purple, enlarging at inner and outer fourth and contracted in the middle.

Three specimens: Chicago, Ill., June, J. H. Reading; New Brighton, Pa., June 22d, F. A. Merrick.

curvalana var. nov.

Like type, except the forewing is overcast with a bright ochreish-red, except at the base, and narrowly on termen, which are yellow, and a round yellowish spot in middle of wing at end of cell. A distinguishing feature of this variety is a wide, sweeping curve from outer third of costa to anal angle, which outlines the ochreish-red area.

Ten specimens: Montclair and Essex Co., N. J., June 14th to 28th; one specimen bred from larva on huckleberry.

I think careful breeding may develop the fact that we have more than one species in the above. Besides huckleberry, they have been bred from rose and oak. I believe there is only one brood. The larvæ are among the earliest in the spring, feeding on young leaves in the bud before they have unfolded.

Phalonia bana sp. nov.

Expanse 12–14 mm.

Head and thorax rich brown, speckled with darker and lighter dots; palpi creamy-brown, dotted with darker scales; antenna creamy-brown, obscurely darker between joints; abdomen dark brown; anal tuft ochreous.

Forewing: rich chocolate-brown, mottled with dark brown especially on costa and outer margin, and with two prominent fasciæ or patches of irridescent pink raised scales.

There is a fascia of pink, broadest on costa, enclosing the basal area. It runs obliquely inward to dorsum. Above the middle it is traversed by two brown strigulæ; adjoining it, on the dorsal margin, is a rounded spot of shining raised black scales, mixed with a few whitish scales. Between this fascia and the base along the dorsum are three small patches of pink scales. There is a long oblique streak of pink scales from the middle of the dorsal margin to the costa. Just before the apex and at the middle of the wing it connects with a large circle of the same scales, which occupies the outer third of wing, and encloses an immense ocellic spot. Beyond this circle there is only a flattened triangular patch of the ground color, heavily overlaid with black, running from the costa at apex to middle of outer margin. Between the inner fascia and the outer line of pink scales the ground color forms a well-defined brown band, with the patch of black and white raised scales at its lower end. The costal edge beyond the middle is tinged with rose pink (not metallic), and between the inner fascia and the apex is marked with six black dashes. About nine small black dots are on the costa between base and outer edge of inner fascia. A fine line of black outlines the lower half of the outer margin above the anal angle. There is a small circle of pink raised scales in the apex enclosing a small spot of leaden-metallic scales. This circle is half in the wing proper and half in the cilia. The cilia is brown and ochreous-brown, heavily overlaid with pink and leaden-metallic scales.

Hindwing brown, cilia paler; underside pale brown with dark brown strigulæ.

Underside forewing deep smoky-brown, with costa thickly dotted with creamy-white spots.

Two specimens: Chicago, Ill., June, J. H. Reading.

Phalonia zaracana sp. nov.

Expanse 13 mm.

Head, palpi, antenna, thorax, abdomen, and legs creamy-white or whitish-fawn.

Forewing: the basal area is whitish-fawn, rather heavily powdered with brown on costa and below it towards base. Its outer edge begins at inner fourth of dorsum, and curving slightly outwardly ends at middle of costa. Following this is a broad reddish-brown fascia; its outer edge begins at outer third of dorsum and ends at outer third of costa, slightly curving inward at upper end. The space beyond is a light ochreous-brown, dusted with darker scales at apex. Cilia whitish.

Hindwing: above and below whitish-fawn; cilia the same. Underside forewing light coppery-brown.

Two specimens: Central N. Y., June 6th, and northern Illinois; both from Dr. Dietz.

This species may be a variety of *P. straminoides* Grote, which it resembles. Beyond the central fascia of *straminoides* is a shade of the same color as before the fascia, distinctly outlining it on both sides. In *zaracana* the fascia and outer part of wing are all dark and in strong contrast to the light basal area.

Phalonia biscana sp. nov.

Expanse 15–23 mm.

Head: light ochreous-brown on top and in front, darker on sides; palpi, inside light ochreous-brown, darker outside; antenna, light fuscous; thorax, light brown, posterior and tips of patagia lighter; abdomen and legs light ochreous, latter dusted with brown.

Forewing: Narrow and pointed, light brown, with several obscure lines and fasciæ of a darker shade of brown; in some specimens these are almost obsolete. In the most plainly marked they occur as follows: from inner fifth of costa obliquely outward to inner third of wing a third below costa; thence equally oblique inward to a third above dorsum, where it disappears. A similar line starts from middle of costa to end of cell, thence inward to dorsum, a little beyond middle. A narrow terminal line running into apex with an indentation a third below costa; a V-shaped mark on outer fifth of costa; cilia concolorous.

Hindwing and underside of both wings shining gray, slightly ochreous along costa of forewing.

Thirty specimens: Essex County Park, N. J., July 15th to Sept. 12th; New Brighton, Pa., Aug. 24th, F. A. Merrick; Dalton, Glenburn, and Carbondale, Pa., July 29th to Aug. 6th, A E. Lister; Orono, Maine, Prof. Fernald; No. 39,455, H. G. Dyar.

Phalonia biscana var. **giscana** var. nov.

Expanse 13–15 mm.

Similar to above, except that the head parts and thorax are a lighter brown, the forewing a light ochreous-brown. The fascia and lines are a fuscous-brown and well defined on the pale ground color.

Eight specimens: Essex County Park, July 24th to Sept. 15th; one specimen from Prof. Fernald; no locality label, probably Orono, Maine.

Phalonia bomonana sp. nov.

Expanse 14–16 mm.

Head: Shining dirty white; palpi dull white, ochreish-brown on outside, apical joint brown; antenna fuscous-brown; thorax dirty white, stained with yellowish in front and at base of patagia; abdomen white with a faint pink tinge; tuft bleached straw; legs whitish, dusted and banded with blackish-fuscous.

Forewing: dirty white, with an inner and outer fasciæ, each consisting of several ochreish-red and reddish-brown spots, separated from each other and outlined by shining white lines. The inner fascia is composed of a round spot on inner fourth of costa, a flattened oval spot in middle of wing, and a shade on dorsal margin. The outer fascia begins as a dark brown streak on outer third of costa, which enlarges into a large oblique oval spot of Indian red, with a horizontal streak of pale ochre through the middle of it. At end of cell, over base of veins 3, 4, and 5, is a smaller spot, and on dorsal margin a triangular spot with its outer angle in anal angle. There is a broad terminal band of dirty yellow and brown; before it, between veins 4 and 6, a similar broader band; between 6 and 7, a long horizontal streak, and a similar shade between 2 and 4; a shade of coppery-red below costa at base. The costa is blackish-brown on the inner fourth.

Between the fasciæ are two dots, and between outer fascia and apex four to six more of the same color. There is a small rounded spot of reddish-brown below costa at outer fifth. Cilia whitish.

Hindwing: dark purplish-gray; cilia white, underside paler; underside forewing dark purplish-gray; the outer half of costa dull ochreous, with a dark spot at end of each vein.

Three specimens: Chicago, Ill., June, J. H. Reading; Hastings, Fla., March 19th, W. G. Dietz, collected by A. J. Brown.

Phalonia ziscana sp. nov.

Expanse 19 mm.

Head: light fawn, shaded with darker above eyes, cream-white, dark fawn on outside; antenna pale fawn; thorax pale fawn, streaked with darker fawn; abdomen and legs grayish-fawn, latter banded and powdered with dark fuscous.

Forewing: light fawn, marked with reddish-fawn and silvery-white lines. There is a streak of reddish-fawn from base to inner fourth between top of cell and costa, its outer edge oblique, and with a darker oblique shade in the middle; below this is a large dark fawn spot, narrow at base, broadening outward, reaching inner third in middle of wing; its outer edge oblique, surrounded by shining white line. In middle of costa a narrow oblique band goes to top of cell; it is darkest on costa. Below is a small, flattened ovate Indian-red spot, circled by shining white at end of cell; below is a paler spot of the same size, below which is a large spot on dorsum, its upper half Indian-red and lower half pale fawn. Both of these spots are enclosed by shining white lines. A line of shining white runs from apex to anal angle; between it and termen is a line of olivaceous-fawn. From the outer fifth of costa a shining white line runs into apex, enclosing a light brown costal spot, and separated from the vertical white line by a small dot of fawn. The light fawn interspaces are more or less streaked with a light olivaceous shade. Cilia light fawn, the lower half preceded by a shining white line which cuts into the cilia.

Hindwing: shining fuscous, cilia paler; underside the same. Underside forewing dark fuscous, lighter along costa, with dark dots at end of each vein.

Two specimens: Hastings, Fla., Feb. 26th, A. J. Brown.

This species, *bomonana* and *obliquana*, are all of the same general design. The arrangement of spots and the colors are sufficiently different to distinguish them.

Phalonia carmelana sp. nov.

Expanse 11–12.5 mm.

Head, palpi, and thorax hoary gray; antennæ yellowish-gray; abdomen light fuscous; anal tuft and legs bleached straw, latter banded and dusted with blackish-brown.

Forewing: whitish-gray, finely speckled with black. Some of these black dots are irregularly arranged in lines, one from outer three-fifths of costa to anal angle and one from outer fourth of costa to lower third of termen; between latter and apex a shorter line from costa. This linear arrangement is not at all constant. There is a shade of pale brown from dorsum at middle to middle of wing. A similar streak crosses veins at end of cell, running into cilia above anal angle,

and a smaller patch before apex; below costa, from base to inner third, is a streak of pale ochreous. Cilia whitish-gray, speckled with black: the black dots are concentrated at the ends of the veins.

Hindwing: light pinkish-gray; cilia paler, with a darker basal line, underside the same. Underside forewing smoky fuscous, with a narrow edging of pale yellow on costa; cilia leaden-metallic.

Twenty-three specimens: Carmel by the Sea, Monterey Co., Cal., April, and San Luis Obispo, Cal., March, by Arthur H. Vachell.

Phalonia carmelana var. **obispoana** var. nov.

I have a number of specimens similar to the above, excepting that the brown dorsal and other brown shades are entirely wanting, and in some specimens the black dots are nearly obsolete. I am inclined to think this is a good species, which the discovery of the food plant and breeding will determine.

Fourteen specimens: San Luis Obispo, Cal., March, collected by A. H. Vachell.

Phalonia wiscana sp. nov.

Expanse 17.5 mm.

Head: hoary white, collar faintly tinged with yellow; palpi grayish-white inside, ochreous-brown outside; antenna yellowish-gray; thorax grayish-white, speckled with fuscous; abdomen grayish-fuscous; legs yellowish-white, dusted and banded with blackish-brown.

Forewing: creamy-white, more or less mottled with light wood brown. The basal area is almost uniformly cream-white; its outer edge extends from inner fourth of dorsum to middle of costa. It is very faintly strigulated with pale fuscous, with a darker shade of same color in inner fourth of costa. This is succeeded by a narrow light brown fascia with irregular edges, broadest on dorsum, and ending beyond middle of costa with a darker spot. Beyond this is an irregular creamy-white and mottled fascia, extending on costa to outer fourth and below middle of wing, dividing and sending one fork to middle of dorsum and one to anal angle. The forks enclose a triangular mottled gray-brown dorsal patch. From the costa a narrow curved cream-white band leaves the fascia, reaching termen below middle and follows it to anal angle, where it joins the outer fork of the fascia. It encloses a large oval patch, gray-brown, containing a few black scales in upper end. Beyond the upper half of this curved band, and outlining the apex, is a curved narrow band of brown and black from outer fifth of costa to middle of termen. This is the most conspicuous mark on the wing. Beyond it is a narrow band of cream-white, mottled with pink, outside of which are short brown lines in apex. Cilia whitish towards base and yellowish outwardly, divided by a light fuscous line and marked with fuscous spots at end of each vein.

Hindwing and underside forewing smoky fuscous; underside hindwing yellowish-gray, mottled with light fuscous-brown on upper half and before termen.

One specimen: Milwaukee Co., Wis., F. R. collector, from Dr. Dietz's collection.

Phalonia basiochreana sp. nov.

Expanse 18 mm.

Head, palpi, thorax, and basal area of forewing light ochreous; antenna and abdomen yellowish-fuscous; legs whitish, dusted with blackish-brown.

Forewing: the ochreous basal area extends to inner third on costa and inner fourth on dorsal margin. It is shaded with fuscous at base of costa. There is a large triangular patch of grayish-purple in middle of wing, widest on dorsum, where it extends from yellow basal area to anal angle. It does not reach costa, but ends at top of cell, where the apex of the triangle is flattened. On the middle of costa is a small square spot of grayish-purple, separated from the large lower patch by a yellow line. Below this are two superimposed spots of black surrounded by yellowish-brown. These spots are in the large purple area. Beyond the end of cell is a lunate spot of dull ochreous enclosing a black spot in its upper end. A narrow band of the same color curves outwardly from outer fifth of costa to lower third of termen, thence into anal angle, where it joins the lower end of the lunate spot; this band encloses black spots at costa and above middle. There is a short dash of dull ochreous from costa before apex and an irregular marginal line of the same color from apex to middle of termen. The interspaces between these ochreous bands and spots are grayish-purple, tending to become white below costa; the bands and spots are irregularly outlined with shining white scales. Cilia white with an ochreous tinge, and interrupted by three ochreous spots on upper half, one of which is in apex.

Hindwing: liliaceous-gray; cilia paler; underside whitish, heavily mottled with light fuscous on upper half and before termen. Underside forewing smoky purple; cilia light ochreous, divided by a darker line.

One specimen: Los Angeles, Cal., June, collected by Bevery Letcher.

Phalonia cincinnatana sp. nov.

Expanse 14-16 mm.

Head, palpi, and thorax whitish-gray; antenna yellowish-gray; abdomen grayish-fuscous; legs whitish, banded and dusted with blackish-brown.

Forewing: inner three-quarters whitish-gray, lightly strigulated with light fuscous. A streak of light ochreous-brown from base to inner fourth below costa, and a well defined fascia of the same color from middle of dorsum obliquely outward to upper vein of cell, with a fuscous spot above it on costa. The outer fourth of wing is ochreous-brown, with a darker brown fascia through it from outer fifth of costa to lower third of termen. The narrow terminal line is black. Cilia ochreous-brown, mottled with black.

Hindwing: smoky gray, cilia paler; underside whitish-gray, reticulated outwardly with fuscous. Underside forewing dark ochreous-brown, mottled with ochreous along costa and termen.

Four specimens: Cincinnati, Ohio, April 23d to 30th, Miss Annette F. Braun.

Phalonia discana sp. nov.

Expanse 12-13.5 mm.

Head: light brown on top; face gray-brown; palpi whitish-gray inside, gray-brown outside; outer end of tuft and apical joint black; thorax gray-brown, with four longitudinal black lines; abdomen yellowish-gray; legs whitish, dusted and banded with blackish-brown.

Forewing: gray-brown, sparsely speckled with whitish-gray scales; the extreme costal edge is marked with a number of small geminate pinkish-ochreous spots, separated and divided by short black lines. There is a wood brown fascia in middle of wing, caused by absence of the whitish specks. It is narrow on costa, enlarging below and covering outer end of cell, cut by a line of ground color on fold, leaving a rounded spot below between fold and dorsum. There is a similar patch beyond end of cell, involving anal angle and lower third of termen. A line of black scales outlines it on outer and upper edges, and a similar line cut through it on outer side, paralleling the outer edge. There is a flattened tuft of raised scales in middle of wing at end of cell and another near base of vein eight; also one at anal angle. These tufts, with the outside black lines, form a nearly complete circle, and, as the black lines are finely edged with whitish and a few whitish scales occur in the tufts, the circle, under a low-power glass, appears white. Beyond the black line the apical margin is brown, with a sinuate white edged black line from costa crossing it. Cilia pinkish-gray, with a gray and black spot at end of each vein.

Hindwing: light gray, brownish at apex; cilia grayish-white, preceded by a broad, darker and a thin, paler line; underside the same. Underside forewing smoky brown, dull ochreous, dotted with brown on costa.

Eight specimens: Cincinnati, Ohio, Aug. 17th to 31st, Miss Braun; Plummer's Island, Md., Aug., A. Busck.

Cotypes in U. S. Nat. Mus.

Commophila huachucana sp. nov.

Expanse 22–27 mm.

Head and palpi pure white; a few brownish scales on outer end of palpi, outside; thorax white, with a yellowish tinge; patagia pure white; antenna and abdomen light brownish-white; anal tuft ochreous-brown; legs yellowish-white, dusted with ochreous-brown.

Forewing: basal area pure white, shaded below costa with light fuscous-brown and a few bluish scales. This area extends to inner third on dorsum and nearly to middle on costa. It is toothed outwardly below costa and above dorsum. Beyond it is a broad central fascia of light brown, on which is a horizontal dash of black in middle of wing and a black spot below it. The outer edge is very irregular; a rounded spur leaves it at upper and lower edges of cell and one at dorsum. The outer portion of wing is of the same color as middle fascia, except a large patch of white on upper half, from fascia to outer sixth, which sends a whitish shade to anal angle. The latter is more or less overlaid with light brown, and its outer edge is indented in middle of wing. Before the apex the brown area is rather heavily overlaid with dark brown and black, forming a large crescent-shaped black spot with a leaden band through the middle. The dorsal margin below the fascia and white shade is dotted with black. The termen is mottled with brown and cream-white, arranged in irregular lines. Cilia whitish, mottled with fuscous.

Hindwing: grayish-brown, reticulated with a darker shade; underside grayish-white, heavily reticulated with grayish-brown. Underside forewing smoky brown; outer half of costa spotted and upper half of termen streaked with dull ochreous.

Three specimens: Cochise Co., Ariz., Aug. 1st, from Geo. Franck; Las Vegas, N. Mex., U. S. Nat. Mus.; Huachuca Mountains, Ariz., Aug. 8th to 19th; collector, Dr. W. Barnes; received from U. S. Nat. Mus.

Cotypes in U. S. Nat. Mus.

Phalonia vachelliana sp. nov.

Expanse 13–17.5 mm.

Head: ochreous above and in front, dark brown on side; palpi ochreous, blackish-brown outside; antenna gray; thorax black; abdomen gray; legs yellowish-white, powdered and banded with blackish-brown.

Forewing: inner two-thirds grayish-black, outer third cream color. A shade of light brown and cream, mixed with black scales, crosses the dark area from inner fourth of dorsum to costa; it spreads outwardly below costa to inner third. There is a rectangular black costal spot in middle of light area; in middle of wing below it is a smaller blackish spot, and a third one on dorsum before anal angle. Inside of the latter is a brown spot, outlined with cream-white. The light area is shaded with waves of a slightly darker color and with a shining cream-white line. At the apex is a small blackish shade and a faint spot on costa before apex. Cilia cream-white.

Hindwing: gray; underside darker gray, with indistinct darker dots. Underside forewing smoky black; cilia ochreous, preceded by a broad, blackish line and a narrow ochreous line.

Eight specimens: Cisco, Placer Co., Cal., April and June; collected by Arthur H. Vachell.

Phalonia listerana sp. nov.

Expanse 11–12 mm.

Head and thorax coppery-brown; face, base of antenna, and palpi pale ochreous; abdomen fuscous; legs whitish, dusted with dark brown.

Forewing: base, middle fascia, and fascia before termen coppery-brown, streaked across top of cell with ochreous, and usually outlined with ochreous. The interspaces, consisting of a fascia at inner fourth and one from beyond middle of costa to anal angle, purple madder. The basal area is from inner fifth of costa to inner fifth of dorsal margin, outwardly convex. It is somewhat overlaid with purple madder towards base. The middle fascia is from middle of costa constricted a third below, then broadens to double its costal width at dorsum, where it extends from a little beyond middle to anal angle. The outer brown fascia occupies all of the outer fourth on costa. Its outer edge is straight to lower third of termen; its inner edge, a third below costa, curves outward, then downward to termen above apex. Between this and termen is a narrow band of purple madder, which latter color overflows in the cilia.

Hindwing: smoky black; cilia grayish-white, underside dark gray. Underside forewing dark smoky brown; outer ends of cilia dull ochreous.

Four specimens: Nicholson, Pa., July 4th and 6th, A. E. Lister.

Olethreutes islandana sp. nov.

Expanse 14–15 mm.

Head, palpi, antenna, and thorax light ochreous-brown; thorax darker brown in front; abdomen yellowish-gray; anal tuft pale ochreous; legs yellowish-white; front tarsi banded with blackish-brown.

Forewing: inner half mottled dull ochreous, ochreous-brown, and black in vertical strigulation. The outer edge of this area is a line of black scales from middle of dorsum to outer three-fifths of costa. The outer part of wing is of the same vertical strigulated appearance, but the color is cream-white, the strigulations inwardly are pinkish-yellow, and in outer third shining cream color. At the end of cell there is a small circle of black scales, and a black dot at end of each vein from outer fourth of costa around termen to anal angle. There is a subapical line of black, one dot on each vein. The inner fourth of dorsal margin is rather heavily powdered with black, this streak running to middle of base. Each of the black strigulations begins with a black dot or dash on costa.

Hindwing: brownish-gray, underside paler and reticulated with darker brown. Underside forewing ochreous-brown.

Two specimens: Plummer's Island, Md., May; A. Busck, collector.

Cotype in U. S. Nat. Mus.

Phalonia formonana sp. nov.

Expanse 13–15 mm.

Head: cream-white, brownish on sides; palpi cream-white, ochreous-brown outside; apical joint black; antenna brownish-gray; thorax cream-white; patagia and posterior end of tuft ochreous-brown; abdomen mottled gray and fuscous, tuft dull ochreous; legs cream-white, heavily dusted and banded with blackish-brown.

Forewing: cream-white, with dark central fascia and ochreous-brown outer third. The middle fascia is ochreous-brown, dotted with black on edges of lower two-thirds, and narrowly black on extreme costal edge; its inner edge is from inner third of dorsum to middle of costa. The lower end is broader than the upper. The cream color bordering it on each side is edged with shining scales. The inner fourth of costa is ochreous-brown, dotted with black, with two black dashes between this and fascia. A shade of light ochreous-brown spreads from inner fourth of costa to middle of wing, with a lighter shade overspreading the cream-white except narrowly on dorsum and outer edge of the white area. Between the middle dark fascia and dark outer third is a narrow cream-white fascia, broad on costa, contracted at middle of wing, and broadening again to dorsum, where it is marked with three blackish dots. The outer third contains a large patch of dull ochreous from end of cell, touching costa as a dot at its outer edge and curve of termen at anal angle as two dots. There are two blackish dots, one on costa before apex and one in apex, that send a darker fascia-like streak to middle of wing; the inner edge is outlined with shining white, and the outer edge continues as a shining white streak nearly to anal angle. The upper part of this dark streak is overlaid with leaden-black scales, and a horizontal line of black crosses middle of the whole area from end of cell. Cilia dull ochreous-white by reflected light.

Hindwing: light purplish-gray; cilia whitish, divided near base by darker line. Underside the same but paler. Underside forewing smoky black; costal spots repeated as light ochreous.

Eleven specimens: San Luis Obispo, Cal., March and July, A. H. Vachell.

Phalonia maiana sp. nov.

Expanse 7.5–9 mm.

Head, palpi, antenna, thorax, legs, and abdomen cream-white,—last gray above on outer segments before the anal segment.

Forewing: cream-white, shaded with blackish-brown on inner two-thirds of costa, and four or five dots of same color on dorsum. From middle of dorsum a narrow, outwardly oblique fascia, with parallel edges, goes to middle of wing. From the middle of costa a similar semifascia goes to middle of wing. The inner edge of the costal and the outer edge of the dorsal fasciæ run together. From costa before apex a narrow fascia goes to termen just above tornus, diminishing in width below. Beyond it in apex is a shade of ochreous-brown containing a darker costal spot, and a dark spot in the apex is the beginning of a dark terminal line. There is an ochreous streak through middle of wing from middle to outer fascia. The central and other fasciæ are brown dotted with black, especially along their margins. Beyond and parallel with the dorsal fascia are several blackish dorsal streaks. Cilia mottled, gray, brown, and black.

Hindwing: light brownish-gray, cilia lighter; underside light yellowish-gray, reticulated with light brown towards apex. Underside forewing light brown; between veins, in outer half of costa, cream color; the outer fascia repeated strongly, and the middle fascia lightly in black.

Sixteen specimens: Essex Co., N. J., Great Notch, May 4th to 17th.

Phalonia sublepidana sp. nov.

Expanse 8.5–11 mm.

Head: bright yellow, darker on top; palpi yellow, dusted with darker outside; antenna yellowish-gray; thorax brown, posterior edge and patagia bright yellow; abdomen above fuscous and tuft light ochreous; legs light gray, dusted with brown in front.

Forewing: basal third and terminal fourth bright yellow with horizontal streaks of ochreous. Between these yellow patches is a blackish-brown patch in the form of a large H, the two upper bars touching the costa and there edged with cream-white, the two lower bars touching dorsum. Between these, both above and below the horizontal bar, are patches of ochreous-yellow. The dark color of the figure H is outlined with shining steely-gray scales. There is a subapical line of shining cream-yellow. The inner half of costa is narrowly shaded with brown. Cilia ochreous.

Hindwing: purplish-black, cilia paler, with a broad darker line near base; underside grayish-purple. Underside forewing ochreous-brown internally, ochreous around margins.

Five specimens: Essex County Park, July 4th to 7th; Caldwell, N. J., July 1st to 8th.

This species is close to *lepidana* Clem., and I have had it so labelled with a query for some years, but a recent comparison with Clemen's type in the American Entomological Society's collections proves it to be distinct. I also positively identified as *lepidana* a long series of specimens caught several years ago resting on, and

flying up from when disturbed, common horse-mint (probably *Mentha longifolia*) in Jefferson Co., W. Va., at the end of July. Numerous small Tortricid larvæ were later found in the seeds and dried flower sheaths, but I did not succeed in rearing them.

Phalonia aurorana sp. nov.

Expanse 11–13 mm.

Head: speckled gray and brown; palpi cream-white inside, shaded with blackish-brown below and outside; antenna light brownish-fuscous; thorax light pinkish-white, with a dark pink median streak; patagia grayish-brown; abdomen light gray, anal tuft pale ochreous; legs cream color, shaded with brown in front.

Forewing: shining pink, with obscure ochreous-brown fascia and spots as follows: an outwardly oblique fascia from middle of dorsum to costa beyond middle; a narrow fascia from costa before apex to middle of termen; a rounded spot in lower half of wing above tornus. The lower half of the middle fascia is sprinkled with black scales on both sides. There is a small patch of black scales in middle of subapical fascia, and also on the inner and upper edges of the round spot above tornus. There are a few black scales in the shining pink ground color between the middle fascia and round spot, and above the round spot the inner half of costa is very narrowly edged with black. Cilia ochreous, preceded by a black terminal line, and spotted with five evenly spaced patches of black scales between apex and tornus. The black scales are longer than the ochreous scales of the cilia, and each of the five patches sends a little prominence beyond the outer ciliate line.

Hindwing: very light yellowish-gray, cilia paler; underside the same, with a row of brown dots between veins 5 and 6. Underside forewing smoky brown; outer half of costa dotted with pale pink; ciliate spots repeated.

Eight specimens: Essex County Park, N. J., light trap, Aug. 22d to Sept. 7th; Kennebunkport, Maine, from Dr. Holland's collections, Carnegie Museum, collected by G. H. Clapp, August.

Phalonia voxcana sp. nov.

Expanse 12.5–13.5 mm.

Head, palpi, antenna, and thorax very pale whitish-ochreous; abdomen gray; legs whitish, dusted in front with brown.

Forewing: basal area grayish-white, with a faint pinkish tinge, lightly dotted on costa with brown. Central fascia broadest on dorsum, roughly triangular, reddish-brown, shaded with black on edges of lower half, and a horizontal streak across middle. Beyond this is a large round spot,—the outer edges shining pink, the interior light pinkish-brown, with a horizontal black streak through the middle and an obscure shade of blackish on its outer half. Above this the costa is shining pink, marked with three blackish-brown dots. The terminal edge and cilia are shining pink, shaded with blackish at apex.

Hindwing: gray, cilia very slightly paler; underside gray, mottled on upper half with brown. Underside forewing smoky-black; costal and terminal edges dull ochreous.

Four specimens: Hampton, N. H., Aug. 24th, S. A. Shaw; Ottawa, Can., Aug. 16th, C. H. Young; Kennebunkport, Maine, July and August, collected by G. H. Clapp, from the Carnegie Museum.

Phalonia viscana sp. nov.

Expanse 12 mm.

Head, palpi, antenna, thorax, and abdomen light gray, mottled with darker gray; palpi ochreous-brown outside; legs cream-white, shaded with dark brown in front.

Forewing: the basal area is whitish, rather heavily overlaid on and below costa, on dorsal and outer margin and at base with blackish-fuscous. The oblique middle fascia is ochreous-brown, with a whitish dot above and another below middle, both on the outer edge. The outer third of wing is pink, with a brownish-pink fascia through it from costa before apex to middle of termen. This fascia is edged on both sides with shining pink, and the same color edges the inner side of the pink area. Outer third of costa closely spotted with grayish-black. Terminal edge and cilia a uniform shade of ochreous. This shade extends completely around tornus to outer fifth of dorsum.

Hindwing; light gray; underside paler, with a row of blackish dots between veins 5 and 6. Underside forewing smoky black, cilia ochreous.

One specimen: Essex County Park, N. J., May 20th.

Phalonia foxcana sp. nov.

Expanse 11–12 mm.

Head: speckled, whitish and dark gray; palpi whitish inside, grayish-brown outside; antenna gray; thorax speckled brown and gray; posterior end of patagia whitish-gray; abdomen dark gray; legs whitish, dusted with dark brown.

Forewing: almost uniformly dark gray, with a cinereous tinge. There is an obscure outwardly oblique grayish-brown middle fascia and a round spot of the same color between end of cell and termen. The costa before the middle fascia is paler, dotted with blackish-brown; beyond the fascia it is creamy-gray, marked with four blackish dots, and another in the apex, which is followed by five others evenly spaced on the terminal cilia. The dorsal margin is finely dotted with black. The outer round spot is obscurely edged with shining scales. Cilia, between the black spots, speckled light and dark gray.

Hindwing: gray, cilia gray, with a fine whitish basal line; underside gray, mottled with fuscous on upper half. Underside forewing smoky black; costa, between veins on outer half, dotted with cream-white.

Three specimens: Cincinnati, Ohio, Aug. 18th, Miss Braun; Plummer's Island, Md., August, A. Busck.

Cotype in U. S. Nat. Mus.

Phalonia elderana sp. nov.

Expanse 12 mm.

Head, antenna, and thorax light ochreous-brown; palpi cream-white inside, ochreous-brown outside; abdomen ochreous-gray; anal tuft pale ochreous; legs whitish, shaded and banded with blackish-brown.

Forewing: light shining ochreous-brown, with fascia and spots of the same

shade, but not shining. The basal area is vertically strigulated with the dull color. Its outer edge extends beyond third on both dorsal and costal margins. It is succeeded by a dull fascia, twice angulated on both inner and outer edges, and crossed near dorsum by a line of shining scales; above this line on fold is a small cluster of black scales. There is an obscure dull fascia before apex, from costa to middle of termen; this connects with a dull shade above tornus, which sends a streak up to end of cell. Cilia light ochreous-brown, cut at end of each vein with darker brown. The dark color expands on the outer ends of the cilia.

Hindwing: light fuscous gray, cilia paler; underside whitish-gray, with vertical brown strigulations on outer half. Underside forewing light brown, paler around margins; costa and cilia dotted with darker brown.

One specimen: Bred from larva spinning together the young terminal leaves of swamp elder, June 15th, issued July 6th, Anglesea, N. J.

Phalonia nonlavana sp. nov.

Expanse 12.5–13 mm.

Head: whitish, gray on sides; palpi white within, grayish-brown outside; antenna light gray; thorax dark gray in middle, patagia and posterior end tipped with whitish; abdomen grayish-fuscous, with a blackish band on third and sixth segment above; legs whitish, dusted with light brown.

Forewing: basal area outwardly oblique from dorsal third to costa between third and middle; shining whitish, costa marked with black, two long streaks near base and several small ones between these and middle fascia; a row of black dots a third below costa, and a small black dot on dorsum close to base. The middle fascia has nearly parallel edges; it is brown, somewhat broken with whitish ground color below middle, and ending in a blackish costal spot, edged with black lines and angling outwardly. Beyond this is a shining whitish fascia of about the same width, but not sharply defined on either edge. It is somewhat mottled with ochreous-brown and gray and contains two black dots on costa. The outer edge is mottled with black, brown, and gray. A conspicuous fascia starts from costa before apex, reaches termen at middle, continues to tornus, and turns up to middle of wing at end of cell. It is brown on upper third, with three black costal dashes, black in the middle of wing, brown below and on the inner spur, whitish and gray at tornus. There is a brown streak before apex, and the black terminal line is inwardly edged with ochreous. Cilia light ochreous, with an apical and five terminal blackish dashes on the outer ends only.

Hindwing: light gray, underside whitish-gray, spotted with fuscous between veins 5 ond 6; these spots are very faintly repeated above. Underside forewing smoky brown, with five cream-ochreous costal spots and the ciliate spots repeated.

Two specimens: New Brighton, Pa., June 20th, F. A. Merrick; Pittsburg, Pa., June 17th, Henry Engel.

Phalonia toxcana sp. nov.

Expanse 10–12 mm.

Head: white, posterior edge and over eyes shaded with gray-brown; palpi white within, brown speckled with black outside; antenna gray; thorax mottled white and gray, with a transverse, obscure black line before middle; abdomen

shining gray-fuscous, anal tuft dull ochreous; legs whitish, banded and powdered with bronzy-black.

Forewing: pale pinkish-cream, the ground color of the outer third pale whitish-pink. The basal area extends beyond third on both margins. The costa is marked with two small black dots close to base; a large rectangular blackish spot in middle and two or three small dots between the latter and middle fascia. There are two small blackish dots on fold close to base and a larger dot on dorsum near base. The outer edge below fold is speckled with black. The middle fascia begins as a large square blackish spot on costa, obliquely outward; below it, inwardly, an olivaceous fascia continues to dorsum. Its edges are dentate, on the fold and on the outer edge at dorsum are black dots. The blackish middle costal spot sends an obscure streak of black into dorsum before tornus; on the middle of the wing it is interrupted by a patch of shining white, and a similar larger pinkish patch covers the dorsum between the two fascial ends. A conspicuous fascia leaves costa before apex, curving into termen at upper third, diminishing below; is black on costa and before apex, with a small olivaceous patch between and below. It encloses a large spot of shining white, mottled with gray and olivaceous. Above it is a patch of pink with two dark costal dashes. There is a small brown shade in apex, with two dark costal spots before apex on a pink ground. Terminal line black, cilia ochreous, outwardly dotted with black.

Hindwing: whitish-gray, darker around margin; cilia paler; underside the same, shaded and dotted with dark brown below costa. Underside forewing smoky brown, with costal and ciliate spots repeated.

Twenty specimens: Essex County Park, N. J., Aug. 16th to Sept. 11th, light trap.

Phalonia zoxcana sp. nov.

Expanse 8–11 mm.

Head: dark gray; palpi whitish within, dark brownish-gray outside; antenna gray; thorax gray-black, tips of patagia and posterior tuft whitish; abdomen above fuscous, tuft ochreous; legs whitish, banded with blackish.

Forewing: basal area shining, pinkish-white, costal, dorsal and basal margins shaded with olivaceous, and costa dotted with blackish line, a black dot on dorsum near base and a larger vertical streak at lower half of outer edge. The middle fascia is olivaceous-brown, edges irregular, edged with black on costa and a black dash on fold, outwardly, in middle is a short vertical black line. The subapical fascia combines with a black patch before it, in a large rounded black spot, divided by a line of shining gray scales. Below is a patch of olivaceous-brown, and between these dark shades and the middle fascia is an irregular fascia of shining pink, dotted with black on costa and enclosing an olivaceous patch on dorsum, the latter containing three black dorsal dots. Before the black terminal line is a narrow olivaceous brown line, and before this a line of shining pink and gray scales. Cilia divided into four ochreous and five blackish spots of about equal size.

Hindwing: dark gray, cilia paler, with a broad, darker line near base; underside the same, dotted with fuscous between 5 and 6.

Underside forewing: smoky black, with costal and ciliate spots repeated.

Eight specimens: Cincinnati, Ohio, May 21st to June 2d, and Aug. 17th to 24th; Miss Annette F. Brown.

This species is close to *toxcana* K., but can be separated by the extensive black spot in apex.

Carposina comonana sp. nov.

Expanse 16–18 mm.

Head and thorax gray, mixed with brown and black; pale gray within; outside shaded with blackish-gray; antenna yellowish-gray; abdomen yellowish-fuscous, anal tuft pale ochreous; legs grayish-white, front pair heavily powdered with bronzy-brown.

Forewing: narrowly at base and the outer third brownish-gray; between these dark spaces is a wide white fascia, equal in width to half the length of wing; across the outer third of the white area is a curved, light fuscous fascia of spots as follows: on the costa at middle a bronzy-black spot, on top of cell a dark fuscous spot, in upper half of cell a streak and in lower half a larger spot; on dorsum at inner third is a shade of fuscous. A narrow curved line of fuscous parallels the upper half of outer edge of white area. The costal edge in white area is fuscous gray. The dark basal area is widest at costa, curving convexly to dorsum, its widest part is not more than one-seventh the length of wing. The outer edge of white fascia is convex outwardly, starting from costa between middle and outer third, curving to end of cell, thence inwardly to dorsal margin between middle and outer third. The dark area of outer third is marked with an ochreous dash on costa, apex and termen at end of each vein; these dashes are shaded inwardly with black; in the middle of the dark area is a wide streak of black dots, paralleling the edge. At the proper angle the veins in this area are seen to be overlaid with bronzy-brown. Cilia fuscous-gray, sparsely dotted with whitish, and with an ochreous streak from each vein.

Hindwing: light purplish-gray, paler at dorsal edge and base, cilia with a bronzy tinge; underside the same.

Underside forewing: blackish-gray, ochreous spots repeated on outer half of costa, cilia ochreous at base.

Two specimens: San Francisco, Cal.; one from U. S. Nat Mus., no locality, but bearing labels "No. 2617 Apl. 22–82" and "W. knows nothing about it, 1 left. C. V. R. 86."

Cotype in U. S. Nat. Mus.

Eucosma boxcana sp. nov.

Expanse 12–18 mm.

Head: ochreous-brown, face darker; palpi pale ochreous, brownish-ochreous outside, apical joint dark brown; antenna fuscous; thorax gray-brown, minutely speckled with ochreous; abdomen and legs grayish-ochreous, latter dusted and banded with brown.

Forewing: gray-brown; upper half finely atomized with whitish-gray, excepting the costal streaks, which are clear brown. There is a large white dorsal spot extending on dorsum from inner to outer third; its inner edge is sharply outwardly oblique, the outer edge is very slighty oblique; the solid white color ex-

tends to fold, but above fold the spot gradually shades into the ground color, disappearing above middle; there are three or four parallel brown lines in this spot, usually extending to fold, but in some specimens one or more are merely dorsal dots. Before and behind this white spot the ground color is darker brown. The costa between middle and apex is marked with five long, clear, brown lines of about equal length; in the most intensely-marked specimens there is a grayish-brown dot between some of the lines. There is a subapical brown line to upper third of termen, with one or two brown dots below it in middle of termen. The ocellic spot is large, shining gray, with a horizontal brown dash above and an inwardly curved brown dash below, the latter in weakly marked specimens consists of an inner and outer dot; the outer and upper sides of the ocellus are defined by a curved brown line, which very faintly connects with the middle one of the group of costal lines. Cilia gray, basally speckled with pale ochreous, and at tornus outwardly tipped with white.

Hindwing: light grayish-brown, darker at apex, cilia grayish-white; underside paler.

Underside forewing: light smoky brown, slightly paler along costa and grayish white below fold.

Ten specimens: Caldwell, N. J., May 17th; Plummer's Island, Md., May 11th, A. Busck; Philadelphia, Pa., June 4th, F. Haimbach; Cincinnati, Ohio, May 18–21, Miss Brown; Kerrville, Texas, Dr. Barnes; Iowa, C. P. Gillette.

Cotype in U. S. Nat. Mus.

Eucosma womonana sp. nov.

Expanse 15–16 mm.

Head and palpi ochreous-gray, latter shaded with fuscous outside, apical joint black; antenna fuscous-gray; thorax gray, patagia brown at base, ochreous-gray outwardly; abdomen cinereous; legs light ochreous, dusted and banded with blackish-brown.

Forewing: blackish-brown, strigulated with whitish-gray on the inner half of the basal area, with an indistinct dorsal spot, and with costal streaks of the same shade. The outer half of basal area is the blackish part of wing, on dorsal margin it extends beyond inner third; the outer edge is indented, inwardly half-way between dorsum and fold, above the fold it is obliquely inward to inner fourth of costa. The dorsal spot in width is less than one-sixth length of wing, it extends to fold, and its inner edge sends an oblique line to inner costal spot. From the outer fourth of costa to apex are five pairs of costal spots, the three inner pairs are subdivided; the second pair send long oblique lines into the inner ocellic bar; the third pair sends lines beneath the fourth pair and curve downward to a leaden spot on margin, above middle; the fifth, or subapical pair, point toward the same spot. On the costa these marks are yellowish-white, becoming grayish-white below, with a few grayish-metallic scales. The ocellic spot is well within the termen, it contains three horizontal black lines, and a black dot below, a broad inner bar, an outer spot above and a dot below of leaden-metallic, edged with whitish. The subterminal line is broad, blackish-brown, finely dotted with yellowish-white, with a white dash below apex, which curves inward and with the outer half of the subapical costal spot, encloses a small round spot of ground color. Cilia shining gray, tipped with yellowish.

Hindwing: smoky fuscous, paler at base, cilia gray, with a broad darker basal line and a faint thin darker line near outer edge.

Underside both wings: grayish-brown; forewing darker and costal spots repeated.

Two specimens: Cincinnati, Ohio, June 9th and July 11th; Miss Brown.

— **Eucosma walkerana** sp. nov.

Expanse 10–12 mm.

Head, palpi and antenna yellowish-gray, palpi darker gray on ends; thorax gray, abdomen light gray, legs whitish-yellow, powdered with brown.

Forewing: basal area leaden-black, a middle white fascia, outer two-fifths pale ochreous, slightly ferruginous in apex, mottled with black and darker lines and dots. The basal area on dorsum extends to inner third, its outer edge is slightly outwardly oblique to middle, then angles slightly inward reaching costa at inner third; it is grayish black, strigulated with darker lines and suffused with whitish near base below costa; the extreme costal edge is marked with five or six whitish dots. The middle fascia is only half the width of basal area and is not sharply defined on outer edge, it is constricted on upper third where it is overlaid with gray and two leaden lines from costa. Beyond it is an ochreous-brown fascia of about equal width, only defined on lower two-thirds of wing, on outside edge above dorsum is a blackish brown spot connected by a line with a short vertical line of same color on inner edge of fascia, below these dark spots the dorsal edge is gray-brown, on the upper third this fascia diminishes to a line at costa. Beyond the white fascia the costa is marked with four white spots, each containing a blackish dash. The ocellic area is pinkish-white, with vertical shining leaden side-bars, the inner connects with the middle geminate costal spot and the outer with the spot before apex, the connecting lines are often obscure and much broken. There is a large triangular patch of a ferruginous-ochreous in the apical fourth, with a few scattered black scales. Terminal line black, distinct only above ocellic area. Cilia shining leaden, tipped with black at apex.

Hindwing: light brown, cilia whitish-gray; underside whitish gray.

Underside forewing: smoky brown, costal spots repeated.

Five specimens: bred from larvæ in hazle catkins, U. S. Dept. Agriculture, breeding No. 2917, issued June 20th to July 9th; I have fifteen specimens from Nicholson, Pa., July 4th to 24th, collected by A. E. Lister. Five specimens: Mountain Lake Park, Md., July 26th, Miss A. F. Braun.

The species is close to *E. transmissana* Walker, and is named in honor of its author.

Cotypes in U. S. Nat. Mus.

— **Eucosma snyderana** sp. nov.

Expanse 28 mm.

Head, palpi and thorax white, speckled with pale olivaceous-gray; antenna white; abdomen gray, anal tuft white; legs whitish, banded and dusted with dark brown.

Forewing: white, overlaid with pale gray, especially between the veins; with a darker basal shade, large dark crescent-shaped spot on lower half of wing before anal angle and a darker terminal patch. The basal area is light brown dotted with dark brown, it is edged outwardly with an oblique line of dark brown dashes, interrupted on the veins, it begins at outer third of dorsum and is defined only to upper third of wing. A gray shade in the upper third of wing extends from base to end of cell. The crescentiform spot is broadest on dorsum, its upper end curving inward, hook-shaped, it is inwardly edged with dark brown dots and a cluster of the same on its outer edge. Before the termen are two vertical irregalar lines of brown dots. There is a large quadrate brown spot in apex, and a similar but paler one on lower third of termen. Costa white, dotted with dark brown. Cilia whitish, gray at base.

Hindwing: light grayish-fuscous, cilia whitish, with darker line near base; underside lighter.

Underside forewing: smoky gray, costa darker, dotted with white.

One ♂ specimen: Blackfoot, Idaho, June 3d, Arthur J. Snyder.

Eucosma idahoana sp. nov.

Expanse 21 mm.

Head, palpi and thorax olivaceous-yellow, posterior sides of thorax edged with silver; antenna cream-white, annulated with olivaceous; abdomen light olivaceous-gray; legs whitish, dusted with dark brown.

Forewing: olivaceous-yellow, with horizontal silver lines. The costa, beyond male fold, is silver, interrupted by two spots, one beyond end of cell and one before apex. A line from base to end of cell through middle of cell, a duplicate line above its outer half, the ground color between the two dotted with brown. A silver line on outer half of fold and another the whole length of vein 1*b*. Beyond the cell, between veins 3 and 8, the spaces between veins is silver, the veins being dotted with brown. There is a silver terminal line, edged outward narrowly with dark brown and inward with a line of olivaceous yellow. The apical and subapical spots of ground color are dotted with dark brown, and a line of the same are above and below the silver line in outer fourth of fold. Cilia yellowish-white.

Hindwing: light smoky gray, cilia whitish; underside the same.

Underside forewing: olivaceous-gray, whitish on costal and terminal edge, cilia whitish.

One ♂ specimen: Blackfoot, Idaho, June 3d, Arthur J. Snyder.

Eucosma vomonana sp. nov.

Expanse 15-17 mm.

Head light ferruginous-brown, darker over eyes and around collar, palpi grayish-brown, blackish on outside and outer joint; antenna gray; thorax blackish in center, patagia brown at base, striped with pink and white outwardly; thorax cinereous gray; legs yellowish-white, dusted with dark brown.

Forewing: light gray, with a brownish tinge, the tips of the scales are somewhat paler, giving a speckled appearance under a lens. On the middle of dorsum is a broad white patch, with three brown dots on dorsal edge, it is broadest at base, the inner edge is outwardly oblique, the outer edge nearly vertical, it ex-

tends nearly to middle of wing. Before this white patch is an inverted wedge-shaped black spot, overlaid above with light brown. A darker shade from middle of costa forms a fascia that separates the white patch from a gray ocellic spot, the lower half of fascia is dotted with black. The ocellic spot is edged before and behind narrowly with white and a small spot of white color in middle. The black apical spot and a similar costal spot before apex, continue as brown lines to middle of wing, where they join and continue as a single line to termen above apex, the brown is somewhat dotted with black. The male fold is pinkish-white, dotted with dark brown, the second fourth of costa is dark brown, between the middle and spot before apex it is marked with three whitish geminate dashes. Terminal line blackish-gray; cilia leaden-gray, cut with a whitish streak below apex.

Hindwing: smoky brown, cilia gray, with a light basal line, followed by a darker line; underside lighter, reticulated on upper half.

Underside forewing: dark smoky brown, costal spots repeated.

Six specimens: Cisco, Placer Co., Cal., June 1st; Colfax, Placer Co., Cal., July, all collected by A. H. Vachell.

Eucosma miscana sp. nov.

Expanse 16–19 mm.

Head: light brown; palpi cream color inside, and upper edge, the brush outwardly and at the end, both inside and outside, dark gray; antenna gray, annulated with light brown; thorax black, with a transverse pale ochreous line, the posterior edge and patagia same color; abdomen fuscous; legs yellowish, banded and powdered with blackish-brown.

Forewing: pale ochreous, strigulated with black in basal area, a middle fascia of same color but more heavily and evenly overlaid with black, this ground color in outer half, below costa, is a dusky olivaceous-yellow. Between basal area and middle fascia is a broader whitish-gray fascia strigulated with black. The basal area extends to inner third on dorsum, indented below fold, angling outward on fold, then obliquely inward to inner fourth of costa, but indented at upper third. The whitish fascia, beyond it, begins as a geminate yellow spot on costa, it broadens outwardly to dorsal margin. The ochreous and black fascia extends from middle of wing to dorsum before anal angle. The ocellic spot consists of two vertical bars of pinkish shining scales enclosing a black streak, the bars are nearly joined above and below, and above and before them is another short curved line of the same scales separated from the ocellus by a black dash. There is a similar shining line before termen in middle of wing and below it, in angle, a small spot. Between the shining spots and the dusky yellow streak below costa, the ground color is black, finely atomized with white. At middle of costa are two geminate white streaks, close together, between them and apex are three others, more widely spaced, each encloses a black line, and below upper fourth they change to metallic-blue; the one before apex sends a white dash through the cilia and terminal line below apex; the second and third before costa join and run into the shining line before termen. There is a fine black terminal line, interrupted below apex, and not reaching angle; beyond this line is a line of gray which extends around termen. Cilia pinkish-gray.

Hindwing: light grayish-brown, cilia the same, underside the same. darker at apex.

Underside forewing darker.

Thirty specimens: Cisco and Colfax, Placer Co., California, June and July, A. H. Vachell.

Thiodia kiscana sp. nov.

Expanse 12–13 mm.

Head, palpi and thorax white, a light fuscous spot on outside of palpi near base of second joint, and a shade of the same color, both inside and outside, at end of second joint, patagia shining grayish-ochreous; antenna white, finely annulated with fuscous; abdomen grayish-fuscous; legs white, tarsal joints ringed with blackish-brown.

Forewing: pale fawn, with a darker shade in middle of wing from base to end of cell, and another on upper half of wing from before end of cell into apex. The inner half of costa is narrowly blackish, edged internally with white, beyond the middle are four large black streaks and four fine black dashes on a white ground; all outwardly oblique, excepting the white line before the light brown apical spot, which is inwardly oblique, and is edged with blackish scales on each side; the white line, from between the two middle large spots, runs obliquely outwardly and nearly connects with the white line before apex. The ocellus is large, lustrous, white, with a long black line above and one or two shorter ones below it. Below the fold the dorsal margin is sparsely overlaid with white scales. The terminal edge and cilia are light gray, finely powdered with blackish dots.

Hindwing: light gray, smoky towards termen; underside whitish-gray.

Underside forewing: smoky ochreous-brown, costal spots repeated.

Ten specimens: Cincinnati, Ohio, May 27th, Miss Annette F. Braun; Greenwood Lake, N. J, June 10th; Gloucester Co., N. J., May 29th, F. Haimbach.

Epinotia dietziana sp. nov.

Expanse 13–15 mm.

Head: pale ochreous on top, basal joints of antenna, face and palpi white, latter shaded with brown outside; antenna whitish brown; thorax grayish-white above, beneath and tuft white; legs whitish, dusted and banded with blackish-brown.

Forewing: a broad white fascia between inner fourth and middle on costa, enlarging below top of cell and reaching inner fourth to outer third on dorsum. The basal area is gray, with a whitish transverse streak through middle and edged outwardly with black; there are a few black scales on the inner edge of the white streak. The broad white fascia is dotted on costal and dorsal edges with gray; beyond it is a gray fascia, beginning at middle of costa as a blackish spot, continuing to middle of wing as a gray line; at end of cell, in middle of wing, is a small black spot, this is continued as a broader gray fascia to dorsum before anal angle. The space beyond is white, inwardly overlaid with gray and outwardly bordered by dark ochreous-brown, the latter color in a shade beneath costa for outer fourth and running into a conspicuous black ocellic spot. The outer half of costa is marked by four pairs of white oblique lines, divided by narrow black lines, and each pair separated by a larger black spot. The ocellic

area is shining white, with a vertical row of brownish scales. Termen above middle is bordered by a fine black line running into apical spot. Beyond this is a narrow yellowish line in cilia, the latter is blackish with ochreous brown tips.

Hindwing: smoky gray, preceded by a faintly lighter basal line; underside the same, cilia concolorous.

Underside forewing: smoky brown, with the geminate whitish spots repeated on costa.

Twenty specimens: Hampton, N. H., May 28th to July 3rd, S. Albert Shaw; Hazleton, Pa., at electric light, May 19th to June 8th, collected by W. G. Dietz, M.D., and to whom I am indebted for a hundred or more very interesting Tortricids.

Cydia colorana sp. nov.

Expanse 22–24 mm.

Head and palpi clay-white; antenna leaden-fuscous; thorax leaden-fuscous, tips of patagia and posterior edge of thorax white; legs cream-white, lightly dotted with fuscous.

Forewing: ground color, base of scales fuscous-brown, outer half gray to pinkish-ochreous, under a lens as a finely reticulated surface of alternate dark and light vertical lines; below the fold of wing the light tips are gray, becoming ochreous above outwardly and shaded with pink on the outer half above the middle. The ground color is traversed by numerous irregular broken lines of shining leaden scales. The costal edge is narrowly cream-color, with a small black spot beyond middle and four larger ones between it and apex. From the cream-color spaces between these spots the leaden lines begin; the two before apex extend only to upper third, and a single line begins close to termen at middle of wing, and continues to anal angle; before these ante-apical streaks are two others which join at middle of wing and continue to anal angle as a single line, dotted inwardly and outwardly with black below the middle. The other leaden streaks are edged with black dots more or less, usually on their inner sides. The terminal line is black, before which is a pale ochreous line. Cilia shining gray.

Hindwing: smoky gray, whitish above cell, cilia whitish, with a gray line near base; underside the same.

Underside forewing: smoky brown, costal edge yellowish, and a line of same color preceding a blackish terminal line.

Four specimens: three, Glenwood Springs, Colorado, June 1st, Dr. Wm. Barnes, received from U. S. Nat. Mus.; one, Salida, Col., June 19th, "Hulst collection" from Dr. Dietz.

Cenopis chambersana sp. nov.

Expanse 22–25 mm.

Head: ochreous-brown, a shade darker on the anterior edge of the frontal tube; palpi pale ochreous within, outside ochreous-brown, darker at end of tuft; antenna light grayish-ochreous; thorax ochreous-brown, darker than head, posterior end of patagia paler; abdomen yellowish-white, with white scale tufts on first segment above; legs yellowish-white, powdered with bronzy-brown.

Forewing: light ochreous-brown, vertically strigulated, shining purplish-brown,

with several lines and spots of the same shade as follows: below costa at outer fourth is a spot from which a fine line crosses wing obliquely to dorsal edge beyond middle; at end of cell, below middle of wing, another spot which sends a line into dorsum before angle; from a dot at outer third of costa an irregular line curves outward and downward ending in tornus; a faint terminal line. The costa is evenly marked with the upper ends of the reticulations. There is a very short but broad costal fold in the male. Cilia concolorous, shining, with a faint pinkish tinge.

Hindwing: white, lightly stained with ochreous on outer half, which color runs into the cilia; underside pale ochreous.

Underside forewing: light ochreous-brown, with darker reticulations on costa.

Ten specimens: Cincinnati, Ohio, June 12th to July 6th, Miss Annette F. Braun.

I take pleasure in dedicating this species, which differs from any *Cenopis* known to me, to the one of the two pioneers in North American Micro-Lepidoptera, and whose interests and labors were so largely associated with the place of its habitat, V. T. Chambers.

— **Eulia niscana** sp. nov.

Expanse 15–17 mm.

Head: light brown, shaded on sides with darker ferruginous-brown; palpi blackish-fuscous, underside at base pale ochreous; antenna dark fuscous, annulated with yellowish-white; thorax dark ferruginous-brown, patagia and posterior end light ferruginous-brown; abdomen cinereous; legs light ochreous, dusted with brownish-fuscous.

Forewing: reddish-brown, crossed by three narrow shining white fasciæ. The inner is from first quarter of costa to before middle of dorsum. The middle one from middle of costa to anal angle, where it coalesces with the lower end of outer fascia, which starts on costa before apex as a geminate spot; in some specimens this fascia is broken below costa. The white fasciæ are outlined with black scales in the middle of wing, and a dot of black scales in the middle of wing and a dot of black is enclosed in the middle fascia, at end of cell. The edges of the fasciæ are irregular. Between the inner and middle fascia there is a shining patch of pinkish scales on the lower half of wing. The dorsal margin is narrowly dotted with black. Cilia at apex dull brown; below apex, white at base, shading into dull ochreous outwardly.

Hindwing: gray, cilia whitish-gray, with a darker line near base; underside gray, smoky gray below costa.

Underside forewing: smoky brown, with a large middle, and before apex, a smaller geminate costal spot of cream white.

Three specimens: Carmel, California, June, collected by A. H. Vachell.

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ERRATA.

Page 2, line 19, for **sinicolana** read **pinicolana** Dbld.
" 2, " 19, " **buolana** read **buoliana** Schff.
" 5, " 6, " record *read* record.
" 11, " 1, " **rosaschreana** read **rosaochreana.**
" 11, " 32, " Lell *read* Zell.
" 16, " 43, " A. T. Brown *read* A. J. Brown.
" 22, " 3, " **circula** *read* **circulana.**
" 23, cancel lines 2 and 3.
" 31, " 39, " wnite read white.
" 31, " 43, " spade *read* shade.
" 38, " 25, " **distinctana** read **essexana.**
" 45, " 15, " Salidago *read* Solidago.
" 51, " 18, " **Epinotis** read **Epinotia.**

DATE OF PUBLICATION.

As a matter of record it may be stated that each eight pages of this paper have been issued as "Signatures" and mailed to the following five gentlemen on the dates as tabulated: C. H. Fernald, Ph.D., Amherst, Mass.; James Fletcher, L.L.D., Ottawa, Canada; Henry Skinner, M.D., Philadelphia; William Beutenmüller, New York; William G. Dietz, M.D., Hazleton, Pa.

	Mailed from Philadelphia	Mailed from New York
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" 9–16	" 5, "	" 6, "
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NEW MICRO-LEPIDOPTERA.

BY W. D. KEARFOTT, MONTCLAIR, N. J.

New species of Micro-Lepidoptera are accumulating so rapidly that it seems a necessity to get them described and labelled in order to properly take care of them. This is especially so in the case of species named for correspondents, and to overcome the objection of having numbers of *MS.* names in collections.

—*Enarmonia Youngana*, sp. nov.—Expanse, 8 to 11 mm.

Head smoky-black, scales with a metallic reflection, tips paler. Palpi yellowish-gray. Antennæ dark brown, obscurely annulated with shining yellow. Thorax blackish-brown, minutely dotted with metallic. Abdomen black, dotted with golden metallic scales.

Fore wing shining bronzy-brown; crossed at middle by a pair of shining bluish-white fasciæ, and similar pair in the outer third of wing.

The inner half of the dark basal area is heavily overlaid with the bluish-white metallic scales. There are three pairs of white costal spots, followed by a single one before the apex. The inner pair at inner third are the beginning of the first pair of metallic fasciæ, which curve outwardly to middle of wing, then drop directly to dorsal margin, where they are very much wider. The second pair of white costal spots are just beyond the middle, and from the two of them a single streak of blue-metallic runs, outwardly oblique, to the middle of the wing. The third pair of white costal spots are in outer fourth, and from each a blue-metallic fascia proceeds, outwardly oblique, to middle of wing, thence angles inward nearly to but not reaching dorsum at angle; between the two is a black ocellic spot, divided by three lines of golden scales into four horizontal bars; opposite the ocellic spot and on inner side of this fascia is a similar velvety-black spot. From the seventh white costal spot is a short spur of metallic-blue defining a lunate yellowish-white apical spot.

Beyond the middle of the wing the dark ground colour is overlaid with vertical wavy rows of golden-yellow scales. The three outer costal spots are each marked in the centre by a tiny black point. A line of black

scales defines the apex and outer margin, and is interrupted by two yellow dashes above the middle and a broader one just above anal angle. Cilia leaden-metallic.

Hind wing smoky-brown, cilia bleached straw colour. Under side fore wing leaden-brown, with the costal spots and black terminal line repeated.

Nine specimens, bred by Mr. C. H. Young, at Hurdman's Bridge, Ottawa, Canada. Dr. Fletcher informs me that the larvæ are found during the winter in the centre of the cones of White Spruce, *Picea alba*, the moths emerging in the ensuing spring.

Co-types in collections of Fletcher, Young and Kearfott.

Venation : Fore wing, all veins separate, outer margin straight, but very much oblique. Hind wing, 3 and 4 stalked, 5 approximate to 4; 6 and 7 very close at base.

Named in honour of Mr. Young, whose industry and perseverance in working out obscure life-histories of insects, in many cases of extreme economic importance, is of the greatest scientific value.

Epagoge lycopodiana, sp. nov.—Expanse, 13 to 16 mm.

Head, palpi, thorax ochreous-yellow. Palpi outwardly shaded with red, a streak of the same colour on each side of the thorax and at base of patagia. Antennæ reddish-yellow at base, becoming smoky-fuscous beyond. Abdomen smoky-fuscous, anal tuft yellowish. Legs pale ochreous, dusty with smoky-brown.

Fore wing ochreous-yellow, evenly mottled with red. A deep Indian-red fascia begins at costa, between third and middle, and goes obliquely to outer third of dorsum, where it joins a similar fascia, which runs obliquely outward to end of cell. From the costa at outer fourth a line of deep red scales curves outwardly to the anal angle ; beyond this is a short fascia from costa, just before apex, ending in middle of wing, and paralleling upper half of termen. These fasciæ are overlaid with shining bluish scales. In some specimens the deep Indian-red colour almost covers the entire outer part of the wing, from the inner fascia, and in these dark specimens there is only a small patch of the ground colour above the end of cell, on the costa, with a slight shading of yellow before the anal angle. Cilia ochreous-yellow.

Hind wing very dark smoky fuscous ; cilia metallic-fuscous, under side leaden black.

Under side fore wing reddish-black, with a yellowish spot above end of cell; extreme costal edge and cilia reddish-yellow.

Twelve specimens, bred by Mr. C. H. Young, from larvæ feeding in Club Moss, *Lycopodium*, at Hurdman's Bridge, Ottawa, Canada.

Co-types in collections of Fletcher, Young and Kearfott.

This species is very like *Epagoge sulfureana*, Clem., and I have held it for over two years, thinking it possibly might be a variety. I have examples of the latter from nearly all of the Gulf and Eastern States, and while they exhibit a very wide range of variability, there is not one that even approximates this intensely-dark form. It is nearer *E. tunicana*, Wlsm., but is a brighter red.

Venation: Fore wing, 7 and 8 stalked, others separate; hind wing, 3 and 4 approximate, but not connate, 6 and 7 connate, not stalked. In Meyrick's Handbook of British Lepidoptera, the synopsis of this genus states that 3 and 4 of hind wing are connate, and 6 and 7 stalked.

Recurvaria coniferella, sp. nov.—Expanse, 9 mm.

Head opalescent-white, palpi pale cinereous, third joint ringed with black at base and tip. Antennæ whitish, annulated with brown. Abdomen and legs pale cinereous, the latter heavily ringed with black.

Fore wing yellowish-white or pale cinereous, overlaid with white in the middle of the wing from base to end of cell, and above the fold. There are the usnal three oblique fasciæ, all much broken into spots. The inner consists of a black dot on costa at base, and tuft of black and white raised scales below the fold at inner fifth. The second consists of a black dot on costa before the middle, hardly separated from a larger dot below it on the middle of the wing; below this is a third distinctly separated dot above the dorsum. The outer fascia begins in outer third of costa, with a large dot; below it, towards base, is a small round dot, and another towards apex in the form of a short horizontal line; below the first of these, above the dorsum, is another small dot. All of these dots, except on the costa, consist of tufts of black raised scales, bounded outwardly with white raised scales. The apex of wing is heavily powdered with black, obscurely forming four black marginal dots. Cilia gray, overlaid with black.

Hind wing pale gray, cilia yellowish-gray.

Two specimens, bred from larvæ on pine, Ottawa, Canada, by Mr. Arthur Gibson. Issued June 20, 1905. Type in my collection. Co-type in Dr. Fletcher's collection.

In general appearance this species most nearly resembles *R. apicitripunctella*, Clem., the larvæ of which are common on hemlock. *Coniferella* is smaller, the arrangement of spots different, and is a very much darker species.

Recurvaria Gibsonella, sp. nov.—Expanse, 11 mm.

Head opalescent-white, palpi whitish, clouded with light brown on inner sides of second joint, outer joint black, with a narrow white ring at base, a broader one in the middle and a tiny point of white at apex. Antennæ whitish, annulated with dark brown. Thorax whitish-yellow, overlaid with black and brown. Abdomen opalescent-white and brown. Legs yellowish-white, heavily ringed with black.

Fore wing white, shaded with yellowish on apex and crossed by three broad oblique dark brown bands. The inner from costa at base, continuing to below the fold, but not reaching dorsal margin. The second from inner third at costa, broadens at the middle and sends a long spur into the outer fascia. The outer begins on costa at outer fourth, and is the broadest of the three; it recurves inwardly to dorsum. The apex and outer margin are dark brown, enclosing an anti-marginal white spot, which is divided by a streak of dark scales. The usual tufts of raised scales occur on the dorsal half of the three dark fasciæ. Cilia yellowish-white, heavily overlaid with black.

Hind wing yellowish-gray, cilia the same.

Three specimens, bred from larvæ on *Juniperus communis*, by Mr. Arthur Gibson, Ottawa, Canada. Types in my collection, co-types in Dr. Fletcher's collection.

This species is not at all like the specimens I have bred from the same food-plant in New Jersey, and described in the Journal of the New York Entomological Society, September, 1903, but more nearly resembles the two species bred from Spruce and Arbor-vitæ.

Recurvaria obscurella, new name.—I propose this name in place of var. *nigra*, Jour. N. Y. Ent. Soc. XI., 1903, p. 156, as the latter is preoccupied.

Symphysa simplicialis, sp. nov.—Expanse, 11 to 15 mm.

Labial palpi upturned, second joint tufted in front, third joint acuminate; maxillary palpi short, filiform, both pale cream colour, the former clouded with brownish on outside of second and third joints. Tongue long, concealed by well-developed tufts of creamy-white scales.

Antennæ slightly serrate, cream colour at base, outer joints annulated with grayish-fuscous. Thorax grayish-white. Abdomen fuscous and tuft cream-white. Legs cream white, minutely dotted with brown. Tarsi annulated with brown.

Fore wing dark gray, minutely dotted with blackish-gray, a darker shade across the wing at inner third, a short, narrow, outwardly oblique curved line from middle of costa to upper edge of cell, a similar fine white ante-terminal line from costa beyond outer fourth, curving under apex and down to dorsal margin, just before anal angle, slightly indented at lower third. A blackish preciliate line interrupted by the veins. Cilia paler.

Hind wing pale fuscous, thickly dotted with black scales along dorsal and outer margins. An obscure whitish ante-terminal line, strongest towards dorsal margin ; slightly indented at upper third.

Under side, both wings shining pale gray, the white lines faintly repeated.

Two ♂ specimens, collected by Professor F. H. Snow, one Brownsville, Texas, June, and one San Bernardino Ranch, Cochise Co., Arizona, 3,750 feet elevation, August.

One type in collection of Kansas Academy Sciences, and one in my collection.

Differs from *renicularis*, Zell., in the absence of white discal spots, and from both *renicularis* and *eripalis*, Grote, in the outer white lines of both wings being very much closer to the outer margin.

Prionapteryx baboquivariella, sp. nov.—Expanse, 22 to 28 mm.

Head, palpi and thorax sordid white. Scales of outer joint of labial palpi leaden-gray, of maxillary palpi cinnamon-brown ; thorax heavily overlaid with brown, and much darker than the collar and patagia. Abdomen and anal tuft creamy-white. Legs creamy-white. Anterior tibiæ dotted with brown. All tarsi annulated with the same colour.

Fore wing pale olivaceous-brown, with the lower median vein and the veins in the outer third of wing overlaid with white, below the white median vein is a much darker brown streak from base to anal angle, and a dark streak above it from base to end of cell. The outer half of costa is shaded with white, through which run four outwardly-oblique brown lines, the inner, at end of cell, runs into the brown lines above and below the median vein, forming an obscure dark dentate transverse line ; a similar preciliate line of white from costa, outwardly oblique for one-third the width of wing, thence inwardly oblique to a third above dorsal margin,

thence obscurely dentate to margin, is inwardly outlined with darker brown; a short white line from costa at apex to termen. In the middle of the outer margin is a small white ocellic dot, just below the incision, above is a short dark bar, and before it the ground colour is heavily sprinkled with darker scales. Cilia sordid white, divided by a brown line above the incision. Hind wings pale cinereous, with a darker shade before the cilia, which are sordid white, with a slightly darker basal line.

Five specimens, four collected by Prof. F. H. Snow, Baboquivaria Mountains, Arizona, and one Huachuca Mountains, Arizona, O. C. Poling. Co-types in Kansas Academy of Sciences and my collection.

Nearest to *achatina*, Zell., but can be readily separated by the two fine white lines on costa just before apex, which are lacking in *achatina*, and in their place is a rather broad white streak. The four specimens from Prof. Snow are rather badly rubbed, especially over the middle of the wing, causing an impression of a broad white median band.

— *Plutella yumaella*, sp. nov.—Expanse, 16 to 27 mm.

Head with loose scales; antennæ simple, basal joint with dense flaps; labial palpi, second joint with short dense tuft above appressed to face, third joint short, obtuse; both head, palpi and thorax grayish-white, mixed with black scales, patagia tipped with ochreous scales, posterior thoracic tuft white, stained at the ends with ochreous.

Fore wing elongate ovate, whitish-gray, mottled with black. The basal area to one-fourth on costa and one-third on dorsal margin is heavily mottled with black, beyond is a narrow oblique whitish fascia, beyond this the wing is heavily mottled, but interrupted on upper half by a crescent-shaped whitish fascia, which leaves costa at middle and regains it at outer fourth; the apical fifth is whitish, less overlaid with black. Cilia whitish-gray, speckled with black.

Hind wing and under side of both wings cinereous. Abdomen cinereous, with a tuft of ochreous scales on each side on the middle segments, anal tuft dark ochreous. Legs cinereous, anterior and middle and tarsi of posterior legs heavily speckled with black.

Two specimens, San Bernardino Ranch, Cochise Co., Ariz., 3,750 feet elevation, August (F. H. Snow). One, Brownsville, Texas, June (F. H. Snow). One, Gila Co., Ariz., June (O. C. Poling). One, Baboquivaria Mts., Pima Co., Ariz., July 15-30 (O. C. Poling). Two, So. Arizona (Poling). Nine specimens, Yuma Co., Arizona Desert, received from J. B. Smith.

Types: University of Kansas and my collection.

Placed in *Plutella* tentatively; agrees with Meyrick's definition, except that 3 and 4 hind wings are not approximate, the palpi are tufted above and not beneath.

Genus Dorota, Busck.

The moths of this genus superficially resemble Crambids, on account of their long, extended labial palpi; so far they have only been taken in Arizona and California, and only a very few specimens are known.

I have a fine specimen of *lineata*, Wlsm. (*virgatella*, Busck), from Cochise Co., Ariz., June 4, 1904, from Geo. Franck, and two very distinctly marked species, which are described below. The four known species can be separated by the following table:

Fore wing with lighter median streak ..... 1.
Fore wing without lighter median streak ..... 2.
1. Ground colour light ochreous-brown ..... = mediolineiella.
Ground colour ashy-gray ..... = albastrigulella.
2. Fore wing marked with darker lines ..... = lineata.
Fore wing not marked with darker lines ..... = inorratella.

Dorota mediolineiella, sp. nov.— ♀. Expanse, 27 mm.

Palpi, head and thorax pale yellowish-brown, speckled with gray-brown; palpi long, about 4 mm., porrect, outer joint sharply bent downward.

Fore wing 3½ times as long as broad, lanceolate, pale yellowish-brown, a paler creamy-white streak from base to apex, interrupted at end of cell with a few dark scales, with a darker geminate-blackish streak above it. A slightly darker shade above dorsal margin, and a cluster of dark scales on fold at inner third.

A number of black dots are scattered over the wing, notably a line of eight on inner half close to costa, becoming more widely separated outwardly, one on upper edge of dark streak near apex, about eight in pale streak, about fifteen in three irregular horizontal rows on outer third below middle, four of which are in the cilia, a line of six in two groups of three above fold in middle of wing and one above the fold. Extreme dorsal edge dotted with brown scales.

Hind wing, fuscous-gray, slightly shining, cilia same. Under side both wings fuscous-gray, with a brassy tinge. Abdomen same, anal tuft paler. Legs cream-white.

One specimen, Claremont, Cal. No. 3889. C. F. Baker. Type in my collection.

Dorota albastrigulella, sp. nov.—♂. Expanse, 21 mm.

Palpi, head, thorax and fore wing fuscous, strigulated with pure white. Palpi porrect, 2.5 mm. long, outer joint not drooping, but bent outward, at an angle of about fifteen degrees, the brush from second joint extends as far as apex of third, but is porrect, and with the diverging outer joint forms a Y at end of each palpus. The white strigulations of fore wing are most heavily laid between one-third below costa and one-third above dorsal margin, but hardly in a well-defined streak; towards the apical margin some of the veins are bare of white scales, forming short, ill-defined dark streaks. A dark dot at end of cell and another at inner fourth, both about the middle of wing. Cilia white, divided by a fuscous line. Hind wing fuscous-gray, darker before cilia. Under side, both wings dark fuscous-gray. Abdomen the same, anal tuft paler. Legs yellowish-white.

One specimen, Placer Co., Cal., June 1, 1904. Arthur H. Vachell. Type in my collection.

Holcocera Arizoniella, sp. nov.—Expanse, 15 to 18 mm.

Head, palpi, antennæ, thorax, abdomen, legs and fore wings creamy white; hind wing shining gray-white, cilia cream-white, anal tuft ochreous-white.

Three specimens, San Bernardino Ranch, Cochise Co., Arizona, 3,750 feet elevation, August (F. H. Snow). Twelve specimens, Phœnix and Globe, Arizona, August and October (Kunzé).

Types in University of Kansas and my collection.

Incurvaria Taylorella, sp. nov.—Expanse, 16 mm.

Head hairy, pale straw-colour, darker above; palpi same, with a few burnished scales on outside; abdomen yellowish-white; legs the same colour, but annulated with burnished scales; antennæ pale-straw colour.

Fore wing burnished purple, with a coppery reflection, with four pale yellow spots; a triangular spot on outer third of costa, pointed on its lower end, which extends a trifle more than a third across wing, curved obliquely inwards; below this, on dorsal margin, a nearly square spot, extending upwards a third of the width of wing, and separated by the spot above it by a trifle less than one-third; a larger dorsal spot at inner fourth broadest on dorsal margin, convex on its outer and concave on its inner edge, extends obliquely to within one-third of costa; a spot in the apex with a spur running down through the cilia of the termen nearly to the anal angle.

Hind wings fuscous, with a purplish reflection. Under side of both

wings same as upper, but lighter in colour, the spots of the fore wing faintly repeated.

Two ♀ specimens, Wellington, B. C., May 15, Rev. Geo. W. Taylor; Mt. Washington, N. H., Mrs. A. T. Slosson.

Types in Mrs. Slosson's and my collections.

Closest to *capitella*, Clerck (Europe), which differs in the inner dorsal spot extending entirely across the wing; the outer spots approach more closely together, and the apical spot is absent. This species belongs in group I of Dr. Dietz's revision, and can readily be separated from the two American species by the inner dorsal mark, which in both extends from dorsal to costal margin.

Named in honour of Rev. G. W. Taylor, to whom I am indebted for many interesting specimens.

Amydria crescentella, sp. nov.—Expanse, 16 to 18 mm.

Palpi, head, antennæ and thorax very pale brown, dusted with dark brown, the latter predominant on external surfaces of palpi. Abdomen and legs pale cinereous, tarsi dusted with brown.

Fore wing creamy white, slightly dusted with brown scales; this light ground colour only occurs in a large triangular basal patch, extending to a quarter on costa and nearly to middle on dorsal margin. A curved oblique fascia from middle of costa to end of cell, a similar but narrower fascia from costa just before apex, curving inwardly towards but not reaching the middle fascia. These two fascias are so sharply defined against the dark brown of the balance of the wing that they appear as a crescent-shaped band, interrupted in the middle.

The balance of the wing is cinnamon-brown, dotted with darker brown. In some specimens the pale basal area is rather heavily dusted with brown inwardly, leaving only the margin of the pale colour, forming a narrow oblique fascia. On the costa, within the crescent, are two pale dashes separated by a dark dot, and outwardly bounded by dark brown, which also extends below them. Before the middle of fascia the costa is cream colour, marked by a number of brown dots. On the outer margin is a line of dark brown dots, separated by a few paler scales. Cilia same as dark portion of wing.

Hind wing light cinnamon-brown, under side of both wings the same.

Five specimens, all Baboquivaria Mountains, Pima C., Arizona, July 15 to 30; two collected by Prof. F. H. Snow, three by Mr. O. C. Poling.

Types, University of Kansas and in my collection.

(To be continued.)

NEW MICRO-LEPIDOPTERA.

BY W. D. KEARFOTT, MONTCLAIR, N. J.

(Continued from page 9.)

Eucosma fuscana, sp. nov.—Expanse, 23 to 30 mm. Head, palpi, thorax and fore wings, brownish-fuscous, finely irrorated with whitish scales; basal area darker, in middle extends two-fifths length of wing.

Head rough, tuft on second joint of palpi flatly triangular, extending below beyond third joint, latter only exposed from above. Head, palpi and thorax grayish brown or brownish-fuscous, finely and closely irrorated with whitish scales, the tip or outer end of each scale is whitish. Abdomen whitish-cinereous, anal tuft cinereous, speckled with white. Legs cinereous, speckled with fuscous, fronts of femora and tibiæ of anterior pair brownish-fuscous.

Fore wing brownish-fuscous, finely and closely irrorated with whitish. The white irrorations are not evenly spread over the entire surface, their absence or partial absence in some places forms darker area; the most prominent of the dark shade is the basal area, which on the dorsum reaches beyond inner third, thence obliquely and somewhat concave to middle of wing at two-fifths from base, above the middle from base to apex the upper half is evenly irrorated, hence the basal dark area is only sharply defined on the dorsal half of wing. At outer third is a more or less obsolete darker angulated fascia; from dorsal margin in the form of a narrow bar pointing toward middle of termen, but in length less than one-third the width of wing, directly above it a similar bar reaches to upper edge of cell; between this outer fascia and dark basal area the white irrorations are thickest, giving the appearance of a paler fascia between these darker shades. Paralleling the termen the white irrorations are arranged in irregular and broken lines. Male costal fold narrow, about one-third length of wing, appressed and darker brown. Cilia same as outer end of wing.

Hind wing above and beneath, and cilia uniformly pale fuscous.

Under side fore wing, same shade of brownish-fuscous as above, but without the paler irrorations.

Four specimens: Rounthwaite, Manitoba, July, Marmont; Iowa, Ac. Cat., No. 182, C. P. Gillette; Chicago, Illinois, C. H. Fernald, and one specimen from Prof. Fernald, bearing label "10733, Aug. 31," but no locality.

Co-types in U. S. Nat. Mus., Prof. Fernald's and in my collection. In the four specimens before me quite a little variation is observable,

caused by the more or less density of the white irrorations, in one specimen the basal dark area can hardly be defined.

Eucosma bilineana, sp. nov.—Expanse, ♂, 24 to 30 mm.; ♀, 32 mm. Fore wing pale clayish-ochre, with two horizontal black lines, one from base to middle, and one above it from middle to apex, the latter divided and more or less diffused on its outer half.

Head rough, dull brown in front, shading into ochreish-brown on top. Palpi flattened, ovate, scales neither compressed nor loosely laid, apical joint exposed above, but hidden below by projecting tuft from second joint; colour pale ochreish, darker on outer sides and below, apex brown. Antennæ ochreish, lightly ciliated in both ♂ and ♀. Thorax whitish-ochreous, shading into dark brownish-ochreous anteriorly. Abdomen and legs cinereous, tarsi and tibiæ marked and dotted with dark brown.

Fore wing pale, terra-cotta or clayish-ochre; palest along dorsal margin, and overlaid with a deeper ochreous shade along costa and outer third. A narrow black line through middle of wing from just beyond base, nearly to end of cell, where it diminishes to a hair streak and follows vein ii nearly to angle. Above the outer end of the thickened part of this line, at two-thirds length of cell, another wide line begins, and continues to end of cell, where a narrow spur from its up edge continues in termen just below apex; the inner end of this line is somewhat clavate, beyond its outer end, below the apical spur, is a cloud of whitish, dark brown and ochreous scales, between veins v and vii, and over the latter line is a second spur of black scales, but much broken. The costal fold is nearly half the length of wing, closely appressed at base, but rolled over at its outer end; colour, ground colour, but of a more sombre hue; costa beyond fold pale ochreous, with five evenly-spaced black dots, below these are five or six other black dots, not evenly spaced. On the dorsal margin are about the same number of black dots, closer together about the middle. A row of similar dots along the termen, and a few others scattered over the wing, several in the ocellic space, one below outer end of second horizontal line, and a faint line below and paralleling the inner half of the inner line. Cilia grayish-fuscous, paler basally and mottled with darker fuscous scales. Hind wing above and below smoky-ochreous, cilia paler. Under side fore wing smoky-fuscous, paler along costa, where the dark costal dots are repeated. Cilia paler. The above description is from an average ♂, in other specimens the intensity of the dark lines and dots are less or greater. In one ♂ specimen the dark markings are nearly obsolete, leaving only a faint basal and faint outer line, no dots at all, while

in another the dark marks are intensified and the whole outer upper half of wing is clouded with dark scales; the outer end of the outer line divides into three distinct lines or spurs.

I have but one ♀, which differs considerably from the ♂. All of the head, palpi and thorax colouring is much darker. The fore wing is a dull brown, overlaid on lower half below cell with whitish-gray scales, a line of these same scales are above and join the internal black line, and above this is a parallel line of gray-white scales, all the veins beyond the cell are overlaid with the same, and the intervening spaces rather closely speckled with them. The outer black line with its spurs is obsolete, but three or four black dots remain on outer half of costa, and a cluster of black dots on the ocellic space, of which four are in a vertical row along termen and three or four before them.

Seven ♂ and one ♀ specimens. West Manitoba, July, Hanham; Illinois, Prof. Fernald; Iowa, U. S. Nat. Mus. Ac. Cat. No. 383.

Co-types in U. S. Nat. Mus., Prof. Fernald's and my collections.

—*Eucosma madderana*, sp. nov.—Expanse, 13 to 14 mm. Fore wing grayish-white. A large rounded brown-madder spot on outer end of wing, interior of wing washed with fainter shades of this same colour, especially over the basal area, and an oblique semi-fascia from costa beyond middle.

Head rough, rose-madder, palpi same, but a shade darker above and outwardly, tuft compressed, flattened, ovate; outer joint not hidden, brown. Antennæ cinereous, annulated with a darker shade. Thorax smooth, light brown-madder, posteriorly and tips of patagia paler. Abdomen pale fuscous, anal tuft cinereous. Legs steely-fuscous, tibiæ and tarsi streaked and spotted with brown-madder.

Fore wing grayish-white, this ground colour is only distinct before the ovate terminal spot and on dorsal margin before ocellic space, on the latter space it is overlaid with darker scales. Basal area, which extends to inner third at middle and inner fourth on costal and dorsal margins, is a light pink-madder. From the costa just at and beyond middle, an oblique flattened ovate spot on fascia of brown-madder crosses wing towards anal angle, but terminates in a pointed end at vein iii. Between this spot and basal area the colour is a rosy-madder over the gray-white ground. A large, ovate brown-madder spot, its outer margin involving the termen from anal angle to apex, its inner margin curving easily inward from angle to end of cell, then outward to costa before apex; veins iv to viii where they cross this patch are overlaid with fuscous-brown, and where

each terminates on margin are a few yellowish scales, between these is a dark line on the termen, before the cilia.

Costal fold narrow, not closely appressed, about one-third length of wing, colour brown-madder. Costa beyond fold same colours as fascia and patches that touch it. Before the ovate terminal spot the ground colour is the whitest of any part of the wing, and offers a sharp contrast to the dark outer spot; it is divided by a line of madder scales. Cilia grayish-white, tipped with fuscous.

Hing wing pale smoky-fuscous, slightly darker at apex, where a few darker scales form a dot; cilia paler, preceded by a darker, then a paler line. Under side same, but darker.

Under side fore wing dark smoky-fuscous, dark scales more intense at apex, shading narrowly into madder on costa before and at apex; cilia gray, preceded by a darker and paler line, an additional faint narrow dark line precedes these ciliate lines on the termen.

Four specimens. Rounthwaite, July, Marmont; West Manitoba, Hanham; Ottawa, Quebec, vi, 26; Regina, Assiniboia, Willing.

Type in my collection.

— *Eucosma Heathiana*, sp. nov.—Expanse, 17 to 18 mm. Fore wing cream-white, with a dark fuscous dorsal blotch below fold, not touching base and ending before ocellic spot.

Head, frontal tuft pure white, tuft between eyes tinged with very pale brown in some specimens, in others pure white. Palpi pure white, second joint loosely clothed below and above. Scales below longer than above, and the ends almost concealing tip at outer joint, which is obtuse and cream-white. Antennæ white, annulated with light fuscous. Thorax smooth, white, posteriorly stained with fuscous, this darker shade concentrated in form of a dark dot on each side of dorsal line. Abdomen and legs cream-white, tarsi annulated with fuscous.

Fore wing cream-white, a conspicuous dark fuscous blotch occupies all the space between fold and dorsal margin, except at extreme base and ocellic spot. In the most strongly-marked specimens the dark shade is sharply defined by the line of the fold as far as end of cell, beyond it slightly swells upward, terminating in a rounded spot before the ocellic space. In less strongly-marked specimens the white ground colour more or less overlaps the fold, reducing the width of the dark blotch. This fuscous blotch is more or less overlaid with black scales; the latter are more frequent in the rounded process at the outer end. Costa from ♂ fold to apex dotted with about ten brownish to black short dashes, nearly

evenly spaced; from each alternate dash a dark-cream or pale-brown line runs obliquely towards termen, the first merging into second before reaching termen, the three outer ones merging and reaching termen just below apex; the lines are nearly obsolete in some specimens. Between these lines, along costa, the white ground colour has a shining iridescent appearance. The ocellic spot is of the same shining white, enclosing a cream or very pale-brown centre, and contains three short, horizontal black dashes, vertical to each other, with two similar black dashes before the ocellus. These black dashes are easily removed, in some slightly rubbed specimens. Some or all are entirely missing. Cilia cream-white, thickly powdered with dark-gray atoms. Hind wing, above and beneath, very pale fuscous, cilia white, with a faint fuscous line beyond base.

Under side fore wing shining brassy-fuscous, costa narrowly white, cilia cream-white.

Eleven specimens, ♂ and ♀. Cartwright, Manitoba, E. Firmstone Heath; Washington Co., Arkansas, July and August, A. J. Brown. I take much pleasure in dedicating this species to the Dean of our Canadian entomologists. The species is one of the strongly protected kind, and doubtless when at rest on a leaf, with wings folded, it as closely resembles a bird-dropping as the well-known *Stenoma Schlægeri*, Zell., which it superficially resembles.

Co-types: Mr. Heath's and my collection.

Thiodia ochrotermenana, sp. nov.—Expanse, 11 to 15.5 mm. Fore wing, inner three-quarters mottled black, ocellic spot and termen, including apex, dull ochreous.

Head rough, brownish-ochreous. Palpi flattened, compressed, third joint not exposed, brownish-ochreous, stained with darker brown in front and below, and streaks of same colour on outer sides towards base. Antennæ, basal joints light brown, outer joints dentate in ♂, simple in ♀, dark fuscous.

Thorax ochreous-brown anteriorly, patagia same, a dark brown streak on posterior half of thorax. Abdomen cinereous, anal tuft clearer yellow. Legs cinereous, tibiæ and tarsi annulated and streaked with blackish-brown.

Fore wing, inner two-thirds to three-quarters dull black, flecked with a few brown scales, and with darker-black lines, like watered silk. A few brown scales at extreme base, a few about middle of wing on lower half, and two paler spots on costa beyond middle, each enclosing a darker dot. The ocellic space and above it to apex, including the cilia, is dull ochreous.

This ochreous shade begins on costa about one-sixth before apex, as a light ochreous spot with black centre, the division line continues obliquely inward nearly to end of cell, thence to dorsal margin, which it reaches at outer three-quarters; the internal boundary on the lower half is dark brown, the ocellic space beyond is defined by a large U-shaped mark of shining ochreous scales, a narrow horizontal bar and a few black specks of black cross this space, above it, to costa, the ochreous colour is paler than the colour of extreme termen and cilia, but is more or less mottled with shining as well as darker scales. The extreme edge of costa, when viewed from the front, is ochreous its entire length, but interrupted by numerous black scales. The basal area is not defined. Hind wing smoky cinereous, darker towards apex and termen, cilia paler, preceded by a darker, then by a paler line; beneath cinereous. Fore wing beneath smoky black, with four geminated ochreous spots on outer half, and a few single spots of same colour on inner half of costa. Gray below the fold. Cilia ochreous, and a few ochreous scales are scattered along the termen.

Thirty-five specimens, ♂ and ♀. Rounthwaite, Manitoba, July, Marmont; Montreal, viii, 15, A. F. Winn; Chicago, Ills., September, J. H. Reading; Winchenden, Mass., ix, 1, and New Brighton, Pa., viii, 6 to 10, F. A. Merrick; Nicholson, Pa., viii, 5, A. E. Lister; Plummer's Isl., Md., viii, 10, A. Busck; Montclair and Essex Co., N. J., viii, 20 to 26, Kearfott.

Co-types: U. S. Nat. Mus., and in collections of Merrick, Lister and Kearfott.

Proteopteryx Criddleana, sp. nov.—Expanse, 13 to 17 mm. Fore wing whitish-gray, with a bold blackish-gray basal area, sharply angulated outwardly, and a shade of dark colour from end of cell to apex.

Head gray, speckled with fuscous above, face white, palpi, tuft on second joint flattened, rounded above and below, outer half of third joint exposed; whitish-gray, speckled with fuscous above and on outer sides, a strong streak of blackish through middle of tuft from base on the outer side. Antennæ grayish, annulated with fuscous. Thorax smooth, gray, heavily overlaid with black scales in some specimens, patagia same. Abdomen gray, anal tuft cinereous. Legs whitish, fore and middle pairs annulated and streaked with black.

Fore wing: ♂ costal fold narrow, over one-third length of wing, not closely appressed, in several specimens the tuft is expanded fan-like in front of the costa, and fold bent under the costa. Colour whitish-gray, with wave-like shades of cinereous-gray on the outer two-thirds, nearly

paralleling the outer margin of basal area. The latter is large, and is the only distinctly-defined marking on the wing; it consists of black scales heavily overlaying the ground colour, and on costa extends to inner fourth, angulated sharply outward to middle of cell, where it reaches inner third of wing, thence obliquely inward to dorsal margin; it is indented once above and twice below middle. The costal fold is ground colour, with four or five black spots. Costa beyond fold ground colour, with faint streaks of cinereous; towards and at apex and before termen these streaks are more distinct and of an olivaceous cinereous shade. A more or less illy-defined shade of blackish scales begins in the extreme apex and runs obliquely to end of cell; in darkest specimens, usually females, the dark scales forming this shade are roughly grouped in two irregular spots, one involving the apex and nearly to end of cell, the other over end of cell and nearly reaching apex of basal area. Ocellic spot not clearly defined. An irregular vertical bar of lustrous-whitish scales before, and another shorter horizontal bar above the space, a few scales of the same below apex. On the darkest specimens the dorsal margin is dotted with black, in paler specimens these dots are cinereous. Cilia grayish-fuscous, preceded on upper half by a narrow black marginal line, twice interrupted, darker below middle. Hind wing, above and below, smoky-cinereous, darker towards apex, cilia a shade lighter, preceded by a darker, then a paler line.

Under side fore wing smoky-fuscous, grayish-white along costa; cilia grayish-fuscous.

Seventeen specimens, male and female, sixteen from Norman Criddle, Aweme, Manitoba, vii, 24, to viii, 13, and one from L. E. Marmont, Rounthwaite, Manitoba, July. I take great pleasure in giving Mr. Criddle's name to this species, as a slight appreciation of his thorough and systematic work in these minute specimens.

Co-types: Marmont's, Criddle's and Heath's and in my collection.

Hysterosia Merrickana, sp. nov.—Expanse, ♂ 19 to 25 mm., ♀ 22 to 26 mm. Light-brownish-fuscous, outer fourth of fore wing dark brown, an oblique streak of the darker colour arising from dorsum a fifth beyond base, and absorbed in ground colour between middle and upper edge of cell.

Head cinereous, a dot of blackish above eye, beneath base of antennæ. Palpi long, once and a half the length of head, slender, second joint rather closely clothed, above and beneath, tuft longer below, outer joint less than half length of second, exposed; cinereous, dotted with

brown on outside. Antennæ, basal joint large, black, outer joint pectinate in ♂, simple in ♀, fuscous.

Thorax smooth, cinereous, patagia brown. Abdomen and anal tuft cinereous; legs same, thickly dotted and streaked with dark brown.

Fore wing: costa moderately arched, apex rounded, termen straight. Colour in some specimens cinereous-brown to cinereous-gray, in others reticulated all over the surface with fine darker lines. A prominent dark-brown or blackish-brown patch involves the outer fourth, its inner edge begins on costa at three-quarters and proceeds obliquely to anal angle, the division line is slightly concave inwardly. ♂ costal fold less than one-third length of wing, narrow, compressed dark brown. Costa between fold and dark outer patch with seven or eight obscure blackish dots. Sometimes two or three about the middle of costa form a darker shade. From dorsum at inner fourth a streak of brown goes obliquely towards costa, and merges in this middle costal shade; this streak is sharply defined inwardly, but outwardly it is gradually lost in the ground colour; width differs in different specimens, in some it is a narrow band, in others it is distinctly defined for a space equal to a sixth the length of wing. Female specimens are generally several shades darker in all particulars. Ocellic spot not defined, before the ocellic space a quadrate spot of a darker shade than the ground colour, and above it a similar smaller spot. Dorsal margin dotted with black. Two small black dots at end of cell, oblique to each other. The outer dark patch contains three darker dots on costa, and one below costa, a darker reticulation before its inner margin. The basal area is paler than any other portion of the wing. Cilia fuscous.

Hind wing pale fuscous, closely reticulated with darker fuscous, cilia fuscous, preceded by a paler line, hind wing beneath the same, but reticulations more distinct, cilia cinereous.

Fore wing beneath dark smoky-fuscous, costa dotted with cinereous, cilia latter colour.

Eight males, five females. Cartwright, Manitoba, viii, 3, Heath; Cincinnati, Ohio, viii, 30, Miss Braun; Algonquin, Illinois, viii, 4–5, W. A. Nason, M. D.; Mt. Desert, Me., Fernald; New Brighton, Penna., vii, 22, to viii, 31, Frank A. Merrick, whose name I take pleasure in honouring.

Co types: Collections of Fernald, Braun, Merrick, and Kearfott. This species is of the same general appearance as *H. inopiana*, Haw. The latter, however, lacks the conspicuous terminal patch.

(To be continued.)

NEW MICRO-LEPIDOPTERA.

BY W. D. KEARFOTT, MONTCLAIR, N. J.

(Continued from page 60.)

Evetria Siskiyouana, sp. nov.

Head pale ochreous, a dash of dark brown behind antenna and a darker shade above eye; palpi pale ochreous within, dark brown outside, changing to black at apex; antenna smoky-black, whitish between joints, basal joint ochreous-brown; abdomen brownish-fuscous; legs ochreous-white, heavily shaded and banded with blackish-brown.

Fore wing evenly spotted with grayish-ochreous; the margins of the spots are usually shining, and are frequently overlaid with ochreous and ochreous-brown. They are separated by irregular horizontal and vertical black lines. There are four to five irregular vertical rows of spots; where each touches the costa they usually do so as a geminate spot, enclosing a dot of dark brown. Terminal line dark brown, preciliate line black, inwardly edged with whitish, cilia leaden-gray, cut by two dashes of whitish beneath apex.

Hind wing smoky-brown, cilia dark gray; under side dark brown, clouded with whitish, with dark brown spots on costa before apex and terminal line of same colour below apex. Under side fore wing smoky-brown, with dark brown costal spots, separated by cream-white. The description is of the Siskiyou specimen; the one from Oregon is darker, head and palpi dark gray and brown, the spots on fore wing are more overlaid with brown, especially on upper half; but I do not believe they are other than local races of the same species.

Expanse, 21–22 mm.

Two ♂ specimens: Siskiyou Co., California; Oregon, Koebele; both from U. S. Natl. Mus. collections.

Co-type U. S. Natl. Mus.

The larvæ of this species are probably borers in the twigs or cones of *Conifera.*

Eucosma Denverana, sp. nov.

Head and palpi cream-white, the latter a shade darker outwardly and below; antenna cream-white; thorax light brown, finely speckled with white; abdomen and legs creamy-white, latter dusted with dark brown.

Fore wing light brassy-brown, speckled evenly all over with white scales, a darker shade on costa at base, and a faintly darker shade on

inner fourth of dorsum. Cilia very pale fuscous-brown, heavily dotted with whitish scales, with an indistinct darker line at base.

Hind wing light smoky-brown, long hairs at base yellowish, cilia whitish, with a darker basal shade; under side the same, but whiter below middle of wing. Under side fore wing brassy-gray, white below fold, cilia white.

Expanse, 24–28 mm.

Five specimens, all Denver, Colo., four from Dr. Barnes's collection, received from U. S. Natl. Mus., and collected by E. J. Oslar; one collected by Dyar and Caudell.

Eucosma tomonana, sp. nov.

Head, palpi, antenna and thorax hoary-gray; abdomen and legs light cinereous-gray, latter dusted with coppery-brown.

Fore wing hoary-gray, with two blackish-brown dorsal spots. Even under a lens the ground colour is almost uniform, with but very faint strigulations. The costa is streaked with long lines of grayish-brown; one from just beyond middle goes to anal angle, beyond this is a short dash, then a longer line that curves outwardly and ends in middle of termen, enclosing the rounded ocellic area; between the latter line and apex are two shorter lines that join beneath costa, and continue as a single line to termen beneath apex. The gray ground separating these faint brown lines is slightly shining, and on the costa, in each of the gray interspaces, is a narrow darker dash. Below the middle the ocellic area is shining gray, in which are a few horizontal black dashes. The dorsal spots are very conspicuous on the light ground colour; the inner is a flattened triangle with narrow base, on inner third of dorsum; it curves obliquely outward, the upper end, as a fine line, reaching middle of wing; the outer spot is ovate, with its broadest and flat side between outer third of dorsum and anal angle; it does not extend beyond lower fourth. Cilia speckled gray.

Hind wing light smoky-gray, paler beneath costa, cilia whitish-gray; under side the same, faintly reticulated at outer end. Under side fore wing smoky-fuscous, whitish beneath fold.

Expanse, 12–15 mm.

Eight specimens, Montclair and Essex Co., Park, N. J., Light Trap, Aug. 21 to Sept. 11; one specimen, Westmount, Quebec, Canada.

Eucosma gomonana, sp. nov.

Head and palpi whitish-gray, latter a shade darker outside; thorax whitish-gray, mottled with darker gray, ends of patagia white; antenna

whitish-gray ; abdomen light cinereous, upper side of middle segment gray, anal tuft yellowish ; legs whitish, dusted with dark brown.

Fore wing fuscous-brown, crossed by shining gray fasciæ. The dark basal area on dorsum extends to inner third, goes slightly outward to middle, then inward to inner fourth of costa ; it is somewhat mottled with lighter scales, which form an abbreviated fascia on the dorsal half. Beyond is a broad shining gray fascia, divided vertically by a fine line of brown, and on upper half of wing each side is subdivided by a brown line from costa ; its outer edge is slightly convex between costa and fold, widening below fold to dorsum, which it reaches just before anal angle. Beyond is a narrow fascia of brown, beginning as a line from costa and ending at anal angle, where it is half the width of the preceding gray fascia, and of about equal width to a gray fascia which follows it ; the latter begins as a geminate spot on outer third of costa, it is slightly constricted at upper third ; the ground colour on either side of its lower half contains a few black scales. Following is a broad brown spot on costa, diminishing to a line below middle and ending in lower third of termen. Before the apex is a broad gray costal spot, which curves into termen below apex, on its lower edge it connects with a gray spot in the ocellic area. The apical spot is brown, and a streak of the same colour runs before termen to anal angle. Cilia dark gray, with a darker basal line, which is followed by a thin whitish line.

Hind wing light grayish-brown, cilia whitish, with a darker line near base ; under side the same. Under side fore wing smoky-black, gray below fold.

Expanse, 8–11 mm.

Twenty specimens: Essex Co. Park and Watchung Mountains, Essex and Passaic Counties, New Jersey, April 20 to May 15.

Eucosma domonana, sp. nov.

Head, palpi, thorax and antenna light cinereous-gray ; abdomen beneath and anal tuft same colour, above leaden-gray ; legs ringed and dusted with bronzy-brown.

Fore wing bronzy-brown, finely speckled with whitish-yellow ; the few spots and fascia are of the ground colour, with the whitish scales absent. There is a dark spot between fold and dorsum before middle ; a narrow dark fascia from middle of costa to anal angle, three dark costal spots between the fascia and a dark spot in apex ; between each two of the costal spots is a yellowish-white geminate dash. The terminal line is

black, bordered by a broader brown streak below the middle; the terminal line is cut by two white dashes below apex; there are two similar whitish dashes, one above and one below the anal angle, but they do not cut through the terminal line. Between the inner dark spot and the fascia, in the lower half of wing, the whitish specks are somewhat thickened, making a paler middle dorsal patch. Cilia dark gray, paler at base.

Hind wing smoky-brown, cilia same, with a paler line at base; under side both wings the same, with whitish costal dashes repeated on upper wing.

Expanse, 11–12 mm.

Two specimens, Framingham, Mass., June 10, C. A. Frost.

Eucosma zomonana, sp. nov.

Head and palpi cinereous-brown; antenna grayish-white; thorax cinereous-brown, whitish on posterior end and patagia; abdomen grayish-brown, anal tuft yellowish; legs gray, thickly dusted and banded with brown.

Fore wing shining gray, with an outwardly oblique dark brown fascia from inner third of dorsum to middle of wing, a long, outwardly convex brown fascia from between inner third and middle of costa to anal angle; the lower half is much darker than the upper; a brown shade from end of cell into apex, flatly triangular, the points being at end of cell and apex and the flattened base uppermost; the inner end sometimes connects with the dark spot of the dark fascia; this shade and the dark spot define inwardly and above a shining whitish-gray ocellic spot, in the middle of which are two or three horizontal dark brown lines. From outer third of costa are several shining whitish-gray oblique streaks; in the lightest specimens the streak before the apex cuts through the dark shade. The termen is bordered by a whitish-gray fascia. Cilia paler, shining gray.

Hind wing smoky-gray, cilia lighter, preceded by a darker basal line; under side the same; under side fore wing darker.

Expanse, 11–15 mm.

Five specimens: New Brighton, Beaver Co., Penna., May 22 to June 6, and Aug. 23 to Sept. 14, F. A. Merrick. One of these specimens was identified at the U. S. National Museum, for Mr. Merrick, as *E. abbreviatana*, Wlsm., and one as *E. solicitana*, Walk., but they do not resemble either of these species.

Epinotia Watchungana, sp. nov.

Head blackish-brown on sides and face, whitish-gray on top; palpi whitish-gray, streaked with blackish-brown outside above, and speckled with same colour below; apical joint black outside, with a grayish bloom within; antenna brownish-gray; thorax mottled whitish-gray and blackish-brown; the base of patagia is dark and a dark spot before the whitish end of posterior tuft, a fine dark median line; thorax light brown, with overlapping rings of whitish scales; legs whitish, banded and dusted with bronzy-black.

Fore wing mottled light fuscous gray and black, the latter partly of a brownish tinge. The most conspicuous mark is the ocellus, which is large, rounded, and occupies the lower two-thirds of the outer fourth; it is grayish-white, vertical side bars shining, and is crossed by four or five horizontal short black lines. Below the apex on costa is a V-shaped whitish mark that connects with a geminate whitish dash in termen and cilia below apex, below costa this mark is shining; it encloses a rounded pale brown, overlaid with fine black lines, apical spot. The costa from base to apex is marked with black and whitish spots and dashes, usually geminate; from a larger one beyond the middle a black line runs beneath the outer costal spots, turning down below apex and merging in a pale brown streak, overlaid with fine black lines, that lies between upper edge of ocellus and termen. On the middle of dorsum there is an oblique whitish patch reaching above fold, but not to middle; it is streaked with darker lines. Before this is a strong black shade, which on inner side obscurely connects with a circle of black scales on lower half of wing close to base. The extreme dorsal edge is gray, dotted with black. A brownish streak runs from outer third of costa to anal angle. Cilia at apex whitish, below the geminate dashes gray finely speckled with black.

Hind wing whitish except around apex and termen, dark gray, cilia white, with a darker line near base; under side whitish, with a few dark specks along costa. Under side fore wing smoky-brown, with costal spots and ciliate dashes repeated.

Expanse, 12–16 mm.

Thirty-five specimens, nearly all from Watchung Hills, Essex Co., N. J., April 21 to May 8; Gloucester Co., N. J., April 30, F. Haimbach; Grimsby, Ont., J. Pettit; New Brighton, Pa., Mar. 22–April 18, F. A. Merrick; Cincinnati, Ohio, April 22, Miss Braun.

Co-type in U. S. Natl. Mus.

Tortrix Baboquavariana, sp. nov.

Head, palpi, antenna and thorax shades of ochreous-brown and yellowish-ochreous; abdomen grayish-fuscous above, pale ochreous on side and anal tuft ; legs pale ochreous.

Fore wing light yellowish ochreous, somewhat shining and with a slight pinkish tinge; marked with well-defined ochreous-brown spots and narrow fasciæ; these are usually edged with darker brown, and occur as follows: A crescentiform fascia from lower half of base to above middle of wing, extending outward to inner fourth. A narrow diminishing fascia from middle of costa obliquely outward towards lower side of termen, but at lower quarter turning downward and reaching dorsum before anal angle. On the middle of dorsum is a large rounded spot, reaching nearly to middle of wing ; in some specimens a spur from its upper end connects with the angle of the fascia. From costa before apex a fascia, slightly curving inward, ends at lower third of termen. The inner fourth of costa is shaded with dark brown, and a spot of same colour occurs in second quarter, also a dot of the same colour between the two fasciæ. There are a few dark scales before the apex. Cilia concolorous, dotted with brown.

Hind wing olivaceous-fuscous, with a fine yellowish terminal line, whitish above cell, cilia grayish-white; under side grayish-white; under side fore wing darker gray, with spots faintly repeated, cilia light ochreous.

Expanse, 9–10 mm.

Four specimens: Baboquavaria Mts., Pima Co., Arizona, July 15–30, 1903, collected by O. C. Poling.

Tortrix lomonana, sp. nov.

Head smoky-brown, antenna base black; palpi smoky-brown outside, cream colour inside, apical joint black ; antenna yellowish-white ; thorax black, transversely streaked with white; abdomen and legs light ochreous, latter banded with blackish-brown.

Fore wing : Basal area and a large median costal spot dark fuscous, dotted with black, gray and whitish scales ; an oblique middle fascia and large ovate terminal spot white. The outer edge of basal area starts at inner fourth of costa, proceeds obliquely outward to middle of wing, then nearly straight to dorsal margin between inner third and middle; the edge is very finely dentate. The outer dark spot is roughly triangular, on costa it extends from middle to outer seventh ; its inner edge is parallel with upper half of basal edge ; its lower point is about one-fifth above dorsum and nearly opposite anal angle ; the outer edge curves inward at middle

of wing, and the spot is crossed by a line of ochreous-yellow, over which are a few black scales. The upper half of the middle white fascia is rather heavily reticulated with fuscous and dirty white, the former colour starting as three streaks from costa. The outer white patch connects the fascia below the triangular dark spot; it is marked with a few black dots on dorsum, and a streak of faint yellowish scales before the termen. There is a black terminal line, cut by two white dashes below apex, that ends above anal angle. Cilia white, outwardly tipped with fuscous.

Hind wing whitish, reticulated with very light fuscous; under side the same. Under side fore wing smoky-black, paler on costa and dotted with black.

Expanse, 18–19 mm.

Two specimens, Victoria, B. C., Oct. 2, Dr. Wm. Barnes's collection, received through U. S. Natl. Mus. One co-type returned to Natl. Mus.

— *Phalonia romonana*, sp. nov.

Head bleached straw-yellow, faintly darker on sides; palpi same colour, shaded with light brown outside; antenna light gray-fuscous; thorax a shade darker than head; abdomen dark gray, anal tuft tipped with yellowish; legs bleached straw, shaded with blackish-brown.

Fore wing; an inner and outer fascia of shining light pinkish-yellow; a basal patch, central fascia and terminal fascia of dull olivaceous-ochreous. The basal patch extends to inner fifth on costa and dorsum, its edge is irregular but nearly straight, close to base it is overlaid with shining scales. The four fasciæ beyond it are of nearly equal width and nearly parallel edges; the divisional lines are oblique from costa inward, and curved outwardly below costa. There is a conspicuous patch of black scales from end of cell at middle, along outer edge of middle fascia to below fold, with a line of black across fascia, in fold. Beyond this black patch a streak of the dull colour crosses the outer shining fascia, obliquely to anal angle. The dorsal margin is dotted with black between inner fourth and outer fifth. The inner third of costal edge is black, also above the middle fascia, and with two black dots above the outer fascia; there are one or two black dots before termen in middle of wing. The terminal dull fascia is outwardly streaked with shining lines. Cilia concolorous, shining.

Hind wing purplish-gray, cilia whitish; under side paler gray, lightly reticulated with darker lines below costa and before termen. Under side fore wing dark purplish-gray, spotted with dull ochreous on costa, cilia dull ochreous, divided by a broad purplish line.

Expanse, 7.5–11 mm.

Thirty specimens: Essex Co., Park, N. J., August 13 to Sept. 17, Light Trap; Chicago, Ill., Sept., J. H. Reading; Aweme, Manitoba, July 5, Norman Criddle; Plummer's Island, Md., August, A. Busck.

Co-type in U. S. Natl. Mus. ? *no.* 20

Phalonia nomonana, sp. nov.

Head and palpi dirty white, latter brownish outside; thorax gray and brownish-black; antenna fuscous, basal joint blackish-brown; abdomen and legs yellowish-white, latter heavily powdered with leaden-black.

Fore wing shining brownish-gray. There is a broad central semi-fascia, with parallel edges from inner third of dorsum to upper edge of cell, outwardly oblique, and indented on upper edge outside, colour blackish-brown. This is the only conspicuous mark on the wing. The costa from base to outer third is a darker shade and closely dotted with black; between outer fifth and apex are three or four darker dots. The dorsum is dotted with small blackish spots. There is an obscure streak of reddish-brown from beyond middle of cell to anal angle. There is a blackish narrow terminal line, with a few dark dots before it in the middle of wing. Cilia concolorous, divided by a darker middle line.

Hind wing shining light gray, cilia same, with a darker line near base; under side the same, lightly reticulated before apex. Under side fore wing shining smoky-black.

Expanse, 15 mm.

One ♂ specimen, Carmel, California, April, A. H. Vachell.

Hysterosia homonana, sp. nov.

Head, palpi, thorax and antenna cream-white, outside of palpi, base and upper side of antenna brown. Abdomen and legs light cinereous, latter shaded with brown.

Fore wing: Male costal fold brown; balance of wing creamy-yellow, very sparsely dotted with light brown, and strigulated in outer third with shining white; between these lines the ground colour is a shade darker than on inner half of wing. A purplish-black dot in middle of wing at end of cell. Cilia concolorous. In several specimens the light brown specks are entirely wanting, the wing is immaculate except the brown costal fold, the discal dot and the shining strigulation beyond cell.

Hind wing very light yellowish white, lightly strigulated in some specimens; under side the same. Under side fore wing smoky-brown, costal edge and cilia light ochreous.

Expanse, 19–23 mm.

Twenty-three specimens, Verdi, Nev., June, all collected by Arthur H. Vachell.

(To be continued.)

NEW MICRO-LEPIDOPTERA.

BY W. D. KEARFOTT, MONTCLAIR, N. J.

(Continued from page 84.)

Hysterosia Merrickana, Kearf.—I desire to limit the type of this species, *ante* page 59, to the specimens from New Brighton, Pa., consisting of four males and two females, the former expanding 24–26 mm. and the latter 26–28 mm. I have two examples from Montclair, which seem to be identical with those from New Brighton, but there is sufficient variation in the specimens from the other localities to warrant separating them, at least for the present, or until longer series or breeding may prove them to be merely local races or distinct species.

Until recently I have identified all of the ochreous-gray and ochreous-brown specimens, having the characteristic dark oblique line from the inner fourth to dorsal margin, and a paler basal area before it, as *H. inopiana*, Haw.; but the accumulation of over one hundred specimens from many different localities makes it possible to separate them into a number of apparently different forms. The following may be added now, and later it may be thought advisable to characterize eight or ten additional forms which seem to be different :

Hysterosia komonana, sp. nov.

Head and palpi grayish-white, latter lightly shaded with brown outside, antenna gray, basal joint ochreous brown ; thorax whitish-fawn; abdomen light yellowish-gray, segments 6 and 7 light fuscous, anal tuft whitish-fawn ; legs whitish-fawn, dusted and banded with bronzy-brown.

Fore wing : Fold brown; an ochreous-brown shade from inner fifth of dorsum turns under costa at middle, without reaching it; before this shade the basal area is whitish-fawn ; beyond the shade the whitish-fawn ground colour is strigulated with light brown. A darker dot at end of cell in middle of wing. The dark strigulations are somewhat closer together in apical end of wing, but not sufficient to form the dark-apical patch that is so characteristic of this genus. Cilia concolorous, but shining.

Hind wing yellowish-gray, reticulated with light brown, cilia paler, with a darker line near base ; under side the same. Under side fore wing light ochreous-brown.

Expanse, 22–26 mm.

Nine specimens : Alma, Santa Clara Co., California, J. G. Grundel ; Stockton, Utah, Tom Spalding.

April, 1907

Hysterosia waracana, sp. nov.

Head, palpi and thorax cream fawn, palpi darker on outside; antenna leaden-brown ; abdomen yellowish-white, fuscous on two segments before anal segment, with whitish lateral tufts, anal tuft ochreous ; legs whitish, dusted and banded with brown.

Fore wing very pale yellowish-fawn, with only a suggestion of a paler oblique basal line. Cilia the same.

Hind wing purplish-gray, not strigulated, cilia white, divided near base by a fuscous darker line; under side the same, but very faintly strigulated. Under side fore wing ochreous with a purplish tinge, lighter along costa.

The females are darker than the males, fore wing ochreous-fawn ; hind wing darker purplish-gray.

Expanse, 15–19 mm.

Two male and six female specimens : Regina, Assa., July 15, collected by Dr. James Fletcher ; Prince Albert, T. N. Willing.

Hysterosia riscana, sp. nov.

Head light yellowish-brown ; palpi cream-white inside and upper edge, fuscous brown outside and outer ends ; antenna yellowish-gray ; thorax light yellowish-brown, sides of tuft fuscous-brown, posterior end of tuft whitish ; abdomen grayish-fuscous, anal tuft pale ochreous ; legs ochreous-white, dusted and banded with dark fuscous-brown.

Fore wing gray, heavily irrorated with bronzy-black. There is an oblique narrow white streak from dorsum near base to upper end of cell, about inner third; before this streak the dark scales are lessened, causing a gray shade, beyond it they are increased, resulting in a darker shade. The apical area, from outer fourth of costa to anal angle, is darker than the rest of wing ; before it is a narrow fascia paler than the area before it ; this fascia broadens out on dorsal margin, with a spot of whitish scales on anal angle, with a few black dots on its outer edge. Cilia bronzy-gray.

Hind wing bronzy-gray, strigulated with darker vertical lines, cilia whitish-gray, with a narrow light basal line, beyond which is a broader dark line ; under side very light brownish-white, with strigulations much stronger than upper side. Under side fore wing smoky-bronzy fuscous, paler on costa, with a dark spot at end of each vein, the one at vein 10 the largest and darkest.

Expanse, 14–19 mm.

Three specimens : Essex Co., Park, New Jersey, Light Trap, July 2 ; Glenburn, Pa., July 10 and 20, A. E. Lister.

This is allied to *H. Merrickana*, K. It can be separated by the edge defining the dark apical area, which in *Merrickana* is straight, and in *riscana* at upper third turns, goes to costa vertically, making a hump at that point.

Hysterosia tiscana, sp. nov.

Expanse, ♂ 15–18 mm, ♀ 17–19 mm.

Head grayish-ochreous; palpi grayish-white inside, bronzy-black outside; antenna brownish-fuscous, middle of thorax and patagia bright ochreous-brown, edged on side with blackish-brown, the posterior tips of the scales whitish; abdomen grayish-fuscous, anal tuft cinereous; legs whitish, banded and dusted with bronzy-black.

Fore wing mottled shades of gray, fuscous and bronzy-black. The oblique line from dorsum at inner fourth is almost obsolete, being a more intense blackish shade on the dark ground colour; it is, however, sharply outlined on basal side by streak of whitish, mixed with a few ochreous scales. There are three black lines in the apical fourth, beginning on costa and coming nearly together at tornus. These lines are edged with ochreous, and vertical ochreous strigulæ cross the wing, especially on the lower half, between these lines and the base. At the end of cell is an angulated cluster of black scales, margined with white, and between it and the inner of the three black lines is a parallel short black line in middle of wing. Between the middle black line and termen the ground colour is whitish-gray. Terminal line black, cut by three dashes from as many small white spots in tornus. Cilia gray.

Hind wing pale gray, cilia the same, with a darker basal line; under side gray, heavily reticulated with bronzy-brown. Under side fore wing smoky-black, spotted with dull ochreous on costa, terminal line black, preceded by a dull ochreous line. The females are much darker, thorax and fore wing almost uniform bronzy-black, without any paler markings.

Five males and four females, Essex County Park, N. J., Aug 1–22; Light trap.

Hysterosia Cartwrightana, sp. nov.

Expanse, 18–24 mm.

Head and thorax light brownish-ochreous; palpi whitish inside, light brownish-ochreous outside, shaded anteriorly with bronzy-brown; antenna brownish-fuscous; abdomen ochreous-fuscous; legs whitish, banded and dusted with bronzy black.

Fore wing light ochreous-brown, shaded with yellowish-fawn below the fold, and with grayish on the outer half of wing. The dark shades and line are bronzy-black. The dorsal oblique shade from inner fourth is distinct, and ends in a horizontal dark dash in middle of cell. The basal shade before it is whitish. Beyond the middle the costa is marked with four dull ochreous spots and a fifth in apex; from between each of these irregular lines of blackish scales cross the wing. From the end of the cell a dark shade extends to the termen, beginning as a point in the middle of wing, and increasing in width until at termen it extends from apex nearly to dorsum. The space above and below it is by contrast paler. Cilia ochreous-gray, cut between each two veins by a lighter streak.

Hind wing grayish-white to fuscous-gray, cilia paler, preceded by a darker line; under side ochreous-gray, heavily reticulated with dark brown. Under side fore wing smoky-brown, costa dotted with dull ochreous.

Six specimens, Cartwright, Manitoba, E. Firmstone Heath.

— *Hysterosia Pecosana*, sp. nov.

Expanse, 20–25 mm.

Head and palpi ochreous-brown, latter paler inside; antenna grayish-fuscous; abdomen ochreous-brown, anal tuft whitish; legs whitish, banded with bronzy-black.

Fore wing almost uniformly light ochreous-brown. There is a whitish shade before the dark oblique shade from inner fourth of dorsum; the dark shade is only conspicuous at its upper end, where it forms a dark spot in the middle of the wing; there is a similar dark brown spot at end of cell; beyond which are some dark vertical strigulations. Cilia whitish-ochreous.

Hind wing ochreous-gray, cilia paler, with a darker basal line; under side the same, very faintly strigulated with a darker shade. Under side fore wing smoky-brown.

Three specimens, South-west Colorado, July 26, W. G. Dietz; Beulah, New Mexico, July, Cockerell; Pecos, New Mexico, at light, Aug. 16, Cockerell.

The description is from the Colorado specimen. The one from New Mexico is more distinctly marked on costa with blackish dots, and below fold with blackish strigulations.

— *Carposina Ottawana*, sp. nov.

Expanse, 16–17 mm.

Head dark gray, whitish in front; palpi whitish inside, ochreous, dotted with bronzy-brown outside; antenna bronzy-gray; thorax bronzy-gray, posterior end whitish-gray; abdomen dark shining fuscous above, anal tuft dull ochreous; legs whitish, dusted and banded with bronzy-brown.

Fore wing shades of gray and fuscous. There is a whitish-gray basal patch, extending in middle of wing to inner third, with a small bronzy-brown spot on dorsum at base, and another above it in middle of wing extending to costa. The costal edge is slightly darker gray, and is marked with six large bronzy-brown spots between inner third and apex. At the end of cell there are two spots, vertical to each other, of dark brown raised scales, shaded with whitish outwardly. In the fold beyond middle of wing is a short blackish line, above which is a cluster of grayish raised scales, edged outwardly with white. Below the fold, on inner third, is a small blackish dot. There are a few black dots on the outer fourth of wing, below the costal spots, and an irregular line of black dots before termen. Cilia dark, speckled gray.

Hind wing smoky-gray, cilia same but shining; under side paler. Under side fore wing dark smoky gray.

One ♂ and two ♀ specimens, Ottawa, Canada, June 20, C. H. Young.

The fore wings of this species are narrow, but less pointed than *crescentella*, Wlsm.; it resembles *crescentella*, but is generally darker, and the crescent-shaped row of black spots with the white character before them are entirely wanting.

Proteopteryx momonana, sp. nov.

Expanse, 13.5–15 mm.

Head ochreous-gray; palpi cinereous brown outside and in front, inside dirty white; antenna ochreous-brown; thorax grayish-brown; patagia ochreous-brown; abdomen fuscous above, silvery-white below and on sides; legs whitish, dusted and banded with dark brown.

Fore wing dark bronzy-brown, somewhat overlaid with grayish-blue on the inner half, shading into ochreous-brown in the outer half; the ochreous shade is brighter in the apex. There is a conspicuous pure white dorsal spot, between middle and outer fourth; the inner edge is slightly oblique and convex (the dark ground colour is more intense where it touches this spot); it extends to middle of wing, and is slightly angulated at the top; the outer edge is angulated and outwardly oblique; it sends a

spur towards the ocellic apot, and with the ocellic spot encloses a blackish-brown elongated dorsal spot; the latter contains a few whitish scales on dorsum, and the white spot is similarly marked with brown dots. The ocellus is large, the centre is ochreous, crossed by four short black lines; below it is gray, and the vertical side bars are shining gray; at the upper end of the inner bar a gray prominence points toward the outer end of the white dorsal spot. Costa is marked with four black dots, between middle and apex, each outlined by whitish ochreous lines; below costa these lines are leaden-metallic, and proceed horizontally below costa towards termen. Below apex the black terminal line is cut by a white dash, and a similar interruption occurs at the tornus. Cilia leaden-cinereous.

Hind wing whitish-gray at base, shaded with smoky-black outwardly; cilia light gray, with a black basal line; under side grayish-white. Under side fore wing smoky-brown, costal spots repeated.

Eight ♀ specimens, Ottawa, Canada, July 6 to Aug. 8, C. H. Young; Rounthwaite, Manitoba, July, L. E. Marmont.

Fore wing: termen concave between veins 3 and 7, all veins free. Hind wing: 3 and 4 short-stalked, 5 close to base of 4.

Epinotia fortunana, sp. nov.

Expanse, 13–17 mm.

Head whitish-ochreous, face paler; palpi cream-white inside, anterior end and outside darker; antenna pale fawn; thorax dark brown in middle, edged with pale fawn; abdomen dark fuscous; legs cream-white, banded with bronzy-brown.

Fore wing cream-white, with basal area, fascia and spots of black overlaid with ochreous scales. The basal area extends beyond inner fourth on costa, is obliquely outward to middle of wing, then angles slightly inward to dorsum, which it reaches beyond inner third; it contains a streak of cream-white on its inner half on the dorsal margin, which at the outer end sends a white shade above middle of wing; the outer edge touches margin of basal area below the costa, the upper edge of this shade connects with two whitish costal spots; the dark spots, outlined by these white streaks, are ochreous in the middle and outlined with black. There is a cream-white, narrow, angulated fascia in middle of wing, divided by a line of shining pale ochreous. Where the fascia touches costa it is divided by a blackish-brown dash. Beyond the fascia are four large geminate whitish costal spots; the second one is the beginning of an outer angulated fascia, which sends a spur to tornus, and above middle an

inward streak, which connects with a similar outer spur from the middle fascia. The outer costal spot sends a white streak into termen below apex; and just below it a whitish line starts, which parallels termen and connects at the tornus with the spur from the outer fascia. The spots between these whitish bands are black, dusted with ochreous. Terminal line black, cut below apex and in tornus, where the white bands touch these points. Cilia mottled leaden-gray, paler at base.

Hind wing smoky-brown, cilia dark gray, with a darker basal line; under side gray. Under side fore wing dark smoky-brown, costal spots repeated.

Twelve specimens, Ottawa, Canada, June 24 to July 3, C. H. Young.

Enarmonia Fleteherana, sp. nov.

Expanse, 13–15 mm.

Head, palpi and antenna cream-white; thorax cream-white, smooth and shining, with an iridescent reflection; abdomen shining fuscous above, cream-white below; legs cream-white, the anterior pair lightly banded with light brown in front.

Fore wing: Inner half of wing, including basal area, cream-white; the basal area is defined by a broken angulated line of black, starting as a short, outwardly oblique dash from inner fifth of costa to upper edge of cell; in middle of cell, about one-third from base, the line begins again, and continues obliquely to inner fourth of dorsum. In the white area the costa is marked with two or three dark dots, and as many on dorsum beyond the dark line. The white area extends to inner two-fifths on costa and to outer third on dorsum; beyond it the outer half of wing is black, thickly mottled with metallic-blue scales. While the division is sharply marked, the edges of the white and dark areas are irregular. In the black area, at the end of cell, is a large patch of blue-metallic scales, some of which edge the white area; there are a few whitish scales in this patch, and through its middle it sends a black line into the white area. The terminal line is black, preceded by an olivaceous-ochreous shade, and the same shade continues below costa, in the dark area, on which are three blackish-brown spots, edged with pale ochreous on inner, the larger spot on costa, marks the beginning of the dark area. From the pale ochreous costal lines the metallic-blue lines begin below the costa, where they touch the termen; they cut the black terminal line with pale ochreous dashes, one below apex, one above tornus, and one in tornus; these ochreous terminal dashes are of the same value as the costal ochreous dashes. All of the

large ocellic area is overlaid with lines of metallic-blue. Cilia grayish-fuscous, shading into pale-ochreous at base and around tornus.

Hind wing light smoky-brown, paler toward base, cilia pale ochreous, preceded by a dark basal line; under side darker, mottled along costa. Under side fore wing dark smoky-brown, costal spots repeated.

Nine specimens, Ottawa, Canada, June 18 to July 3, C. H. Young.

I take a great deal of pleasure in dedicating this most beautiful and distinctive species to my very good friend, Dr. James Fletcher.

Enarmonia prosperana, sp. nov.

Expanse, 13–17 mm.

Head smoky-fuscous; palpi white inside, fuscous outside, apical joint dark fuscous; antenna and thorax dark fuscous; abdomen shining whitish-fuscous, anal tuft dull ochreous; legs whitish, banded and dusted with bronzy-black.

Fore wing: Inner three-fifths cream white, suffused on the basal half with broad grayish-fuscous strigulæ, becoming paler outwardly, and disappearing before the termination of the white area, and having an angulated white band in the middle of wing; the costa in this area is fuscous, marked with four or five white dashes. The outer third of wing is fuscous, mottled with lighter scales; it encloses a large ocellic spot of three horizontal black lines, and vertical inner and outer bars of metallic blue; a few metallic dots of the same colour nearly join the lower ends of the bars; between and below these dots are black dots, and a broken line of black is in the basal side of the inner bar, with a short line of black before it, in the edge of the white fascia. The outer half of costa is ochreous-fuscous, and marked with four large geminate white oblique lines, each sending below a line of metallic-blue; that from the inner joins the inner ocellic bar: the metallic lines from the second and fourth geminate dashes join and go into termen below apex, where they interrupt the black terminal line. There is a dot or small cluster of black scales between fold and middle of wing, about two-fifths from base; there are a few black dots below the costa. Cilia leaden-metallic.

Hind wing smoky-brown, paler at base; cilia white, with a darker line close to base, and a finer line between it and outer ends; under side darker and blotched with bronzy-brown, especially below costa on outer half. Under side fore wing bronzy-black, with a grayish reflection, costal spots repeated.

Fifty or more specimens, Wellington, B. C., Taylor and Bryant; Vernon, B. C., Venables; San Luis Obispo, Vachell; etc., etc.

This species is close to *succedana*, Schif., of Europe.

(To be continued.)

NEW MICRO-LEPIDOPTERA.

BY W. D. KEARFOTT, MONTCLAIR, N. J.

(Continued from page 128.)

Eucosma Hamptonana, sp. nov.

Expanse, 12.5 to 14 mm.

Head very pale fawn; palpi white fawn, with a darker dusting on outside; antenna dark fuscous, fawn-white between joints; thorax darker fawn than head, posterior half streaked with blackish; abdomen grayish-fuscous, anal tuft with an ochreous tinge; legs whitish-gray, anterior pair dusted with fawn above, and tarsi ringed with black.

Fore wing light tawny-fawn, with a large white dorsal spot, white dashes on costa, and strigulated with black on costal and dorsal margins. The basal area is limited on lower half of wing by white dorsal mark, on upper half it is not clearly defined; on the fold are two black dots, and the male costal fold, which extends to middle of wing, is marked with black dashes, with a corresponding line of blackish dots below; the dorsal margin is similarly marked with black dashes, and the inner edge of the white patch is outlined with black. The white dorsal patch is large, extending from middle of dorsum to tornus, beneath ocellic spot, with two or three dark dots on lower edge; the inner edge curves obliquely outward to above middle of wing, it then follows fold to tornus; outwardly it is somewhat overlaid with fawn and black scales. Between the white patch and costa is a gray shade; beyond this the costa is marked with four long geminate lines, white on costa and shining gray below. Each encloses a small black costal dot, and is separated by a larger black spot; the line below apex curves outward in termen, ending in a white dot below apex. The ocellic area is large, the vertical bars purplish-gray-metallic, the inner is double the width and length of the outer, and above connects with the inner pair of costal lines, below it expands outward beneath the ocellus; in the fawn-coloured ocellus are four or five short black lines and dots, and there is a patch of black on the inner side of the inner bar. Terminal line black, cut with white below apex. Cilia shining leaden-gray.

Hind wing smoky-gray, darker at apex. Cilia whitish, with a darker basal line. Under side yellowish-gray. Under side fore wing dark smoky-gray, blackish towards termen; costal spots repeated.

The description is from a ♂ specimen; the ♀ differs in that the dorsal patch is gray instead of white; the ♀ is also darker, black and brown scales overlay the fawn.

May, 1907

Five specimens: Hampton, New Hampshire, July 7 to Aug. 5, S. Albert Shaw.

— *Enarmonia Shawiana*, sp. nov.

Expanse, ♂, 11.5 to 12 mm.; ♀, 9.5 to 14.5 mm.

Head light olivaceous brown on top, darker on sides, white in front; palpi, ♂ pure white; ♀ cream-white; the outer end of tuft and apical joint smoky-brown; the ♂ palpi are shorter than ♀; antenna fuscous; thorax dark brown in middle, the patagia and an anterior band of grayish-brown, a few whitish specks on posterior end; abdomen dark velvety-brown above, anal tuft gray; legs grayish-white, shaded in front with blackish-brown.

Fore wing blackish-brown with a bronzy-tinge, a conspicuous white dorsal mark and four white costal dashes in outer half. The basal area extends to inner third, its outer edge is generally rounded with indentation at upper and lower fourths; on this lower half is a small patch of white scales, above which a streak of bluish-metallic nearly touches costa. The white dorsal mark is in middle of wing, it is irregular in form, in some specimens with a slight spur from its outer upper corner, in others it is somewhat bifurcated at the upper end with a few dark scales on dorsum; in all specimens it slightly angles outward, and rarely reaches above fold; an inwardly inclined fascia of shining-blue continues from its upper edge to costa, ending on costa as a geminate white spot. Beyond this is a broad fascia of the ground colour, thickly dotted with dull black on costa, and more sparsely on upper half below costa, and lightly with olivaceous-brown on lower half. The outer half of costa is marked with four large white oblique costal streaks, the one before apex is the largest, and in some specimens it is geminate; the inner costal dash sends a curved leaden-blue-metallic line to anal angle, its lower half broadening and forming the inner vertical ocellic bar. Beyond this metallic line the ground colour is coppery-brown, horizontally streaked with black, between the white costal dashes the costa is narrowly edged with black. From the second and third costal dashes a similar leaden-metallic line curves under the apex before the termen, and ends in termen as a white dash about a third above tornus. The outer costal dash is edged below with leaden-metallic scales, opposite its lower end, but not joining it is a white dash below apex. The ocellic area between the two metallic bars is bright coppery-brown, crossed by four or five horizontal black lines, with an indistinct metallic line below. Terminal line black, cut with white dashes below apex at lower third and twice on tornus. Cilia white at apex, leaden-gray below, preceded by a whitish basal line.

Hind wing dark smoky brown, blackish-brown outwardly. Cilia whitish-gray, with a black basal line. Under side both wings grayish-brown, costal spots of fore wing repeated.

Described from two ♂ and seven ♀ specimens. Essex County Park, N. J., July 1 to 17; Newark, N. J., June 9, A. J. Weidt; Hampton, N. H., June 10, S. Albert Shaw.

The New Hampshire specimens are all large, the ♂ 11.5 to 12 mm., and the ♀ 14 to 14.5 mm. One of the New Jersey specimens, from Newark, a ♀, is 13 mm., and seems to be of the same race as those from New Hampshire; the other four New Jersey specimens, all ♀'s, are of a much smaller race, expanding 9.5 to 10.5 mm.; I was inclined to separate them, but most minute examination fails to show any specific difference. This species is closest to *E. bracteatana*, Fern., and the larvæ are likely to be found in the cone scales of some of our eastern Conifera, as is the habit of Fernald's species in California.

Named in honour of Mr. S. Albert Shaw, of Hampton, New Hampshire, to whom I am indebted for a great many carefully-collected and exquisitely-mounted specimens.

Proteopteryx Marmontana, sp. nov.

Expanse, 12.5 to 18 mm.

Head brownish gray; palpi dark gray, paler within; thorax bronzy-black, posterior end and patagia streaked with white; antenna and abdomen dark fuscous; legs whitish, dusted and banded with bronzy-black.

Fore wing: Inner half bronzy-brown, heavily overlaid with gray, the ground colour gradually becomes lighter outwardly, until in the apical third it is bright coppery-brown or ochreous. There is a large white dorsal spot between inner and outer third on lower half of wing, dotted with blackish-brown on dorsal edge, and in some specimens a few dark scales above; the inner edge is outwardly oblique and indented below fold, a short spur follows fold on its outer edge, but excavated beneath. Above this spot a broad double geminate gray fascia continues to costa. The basal area outlined by this fascia and dorsal spot is edged with black scales, in the middle of its lower half is a grayish shade. Beyond the fascia and dorsal spot is a curved coppery-brown fascia, black on costal edge, dotted with black below fold and on dorsal edge, and a few black scales on its outer edge before the ocellus. Beyond this a pair of geminate costal spots send a double geminate band of shining-gray to ocellus, the latter pure white, shining on the sides and mixed with a few shining gray scales, the centre is tinged with ochreous and crossed by three horizontal black lines in the upper half. There are two other

geminate costal dashes between the above and apex, the inner sends a horizontal gray-metallic line to termen beneath apex, it nearly joins a shorter leaden line from the outer dash. The costal dashes are narrowly white on costal edge, each contains a small black costal dot, and between each two the costal edge is narrowly black. Cilia brown at apex, gray in middle of termen and whitish around tornus.

Hind wing light smoky-gray, cilia whitish-gray, with a faint darker basal line; under side the same. Under side fore wing dark gray, costal spots faintly repeated.

The description is from a ♂ specimen from Rounthwaite, Manitoba. The New Hampshire specimens are smaller, and more of a dark browish-hue inwardly and ochreous outwardly. Without a lens the Manitoba specimens look almost black in the inner half.

Twenty-one specimens: Rounthwaite, Manitoba, July 11 to 15, L. E. Marmont; Aweme, Manitoba, July 12 to 24, Norman Criddle; Prince Albert, Alberta, July 19, T. N. Willing; Regina, Assiniboine, July 15, Dr. Jas. Fletcher; Hampton, New Hampshire, Aug. 5 to 10.

This species is nearest *P. momonana*, Kearf., it can be separated by the ocellic spot, which in *Marmontana* has a well defined dark dot in its upper half, also by the inner edge of the ocellus, which in *Marmontana* is straight, while in *momonana* it sends a spur into the dark fascia before it.

I take pleasure in naming this interesting and well-distributed species after Mr. L. E. Marmont, to whom I am indebted for a great many beautifully-prepared specimens of Micro-Lepidoptera.

Epinotia Normanana, sp. nov.

Expanse, 9 to 10.5 mm.

Head and palpi whitish fawn, latter with blackish-brown shade on outside of second joint; antenna grayish-white; thorax light fawn, a faint dark shade in middle of posterior half; abdomen silvery-gray, anal tuft light cinereous, with a few dark scales at its base; legs whitish-fawn, dusted and banded with dark brown.

Fore wing very light fawn, mixed with whitish scales, with large, well-defined black costal dashes, terminal line and dusting. The basal area is only defined on the lower two-thirds of wing, when it reaches to inner third the area is pale fawn, with three vertical black lines on its outer half, the inner only reaching costa, and one black vertical line in the middle of the inner half, with a black dot between latter and base and a slight dusting of black between these lines on the dorsal half. The costa, from base to apex, is evenly marked with black dashes, the three before

apex being very large, triangular in shape and oblique ; they are separated by white costal spots, each containing a small black costal dot ; the outer white spot sends a white line into termen below apex, through black terminal line into cilia, it encloses a blackish apical spot. The pearly-white, shining ocellic bars are joined together below, and enclose a narrow fawn space, dotted with black, above it is a larger black shade. On the outer third of dorsum is a shining pearly-white dot ; between it and the inner ocellic bar the ground colour is rather heavily powdered with black. There is a broad central fascia of ground colour, edged inwardly with white, and in middle near dorsum dotted with black, and a few blackish scales scattered through the centre. Terminal line black ; cilia leaden-metallic.

Hind wing gray ; cilia paler gray, with a darker basal line. Under side the same. Under side fore wing darker gray, costal spots faintly repeated. Cilia leaden-metallic, with black basal and terminal lines.

Fourteen specimens : Aweme, Manitoba, all collected June 27, 1905, by Mr. Norman Criddle, in whose honour the species is named.

Epinotia Kennebecana, sp. nov.

Expanse, 13 to 15 mm.

Head light fuscous ; palpi cream white inside, light fuscous outside, apical joint dark fuscous ; thorax dark fuscous, tips of patagia light gray ; abdomen fuscous, anal tuft cinereous ; legs cream-white, shaded with dark brown.

Fore wing : Basal area blackish-brown, a dark gray shade extends from basal area along costa to apex, and is continued as a narrow black terminal line to tornus. Enclosed in these dark and gray shades, the entire outer two-thirds of wing are white ; the usual white dorsal spot and an abnormally large white ocellic spot joining together, but their relative positions indicated by a shade of scattered gray and black scales between them. The basal area on dorsum extends to inner third, its outer edge is slightly outwardly oblique to above middle of wing, then obliquely inward to costa ; the lower two-thirds is finely dentate. The gray costal shade is marked with four paler geminate spots on the outer half, and before the apex the gray and white is shaded with a yellowish-coppery tinge. The ocellic spot is defined on both sides by vertical shining white bars, each outlined with black scales. Cilia black, divided by a gray line on lower half.

Hind wing light smoky-gray, cilia paler, with a gray basal line. Under side grayish-white, shaded with brown along costa. Under side fore wing smoky-black, costal spots faintly repeated, grayish-white below fold.

Three specimens: Kennebunkport, Maine, August, collected by G. H. Clapp. In collections of Carnegie Museum, Acc. Cat. No. 2351 and 2861.

Co-type in Carnegie Museum.

—*Acleris albilineana*, sp. nov.

Expanse, 21–23 mm.

Head, palpi, antenna and thorax dark hoary-gray, with a purple reflection; posterior end of thorax and patagia ferruginous-purple; abdomen gray, anal tuft dull ochreous; legs grayish-white, dusted and banded with dark brown and ochreous.

Fore wing dark grayish-lavender, with a conspicuous pure white band from base to costa before apex, on the upper third of the wing. At the extreme base the band begins on the costa, but does not touch it again, except at the outer end; the sides of the band are parallel, and it only diminishes in thickness just before the outer end. Above the white band is a costal band of ground colour of about the same width. Below the white band and outlining it the ground colour is darkened by deeper purple and black scales, and with four or five dots of black raised scales in the middle of cell, sometimes with a ferruginous shade. There are three black dots of raised scales in fold, the larger at inner third, another at outer third, and the smallest at outer end of fold. Cilia concolorous.

Hind wing bright shining gray, with a yellowish hue, cilia the same; under side the same, but speckled with dark brown. Under side fore wing shining cinereous-gray, paler along costa.

Ten specimens, Ottawa, Canada, Sept. 23 and April 21, C. H. Young; Hampton, N. H., Oct. 18 and 20 and Mar. 28 to May 2, S. Albert Shaw.

This species is very much like *Acleris divisana*, Hbn. I have not seen the European species, but if Robinson's figure 63, Pl. vii, Trans. Am. Ent. Soc., Vol. II, 1869, is a good representation of it, *albilineana* can be separated by the following differences: white band does not reach apex; white band is straight on its lower edge, not angulated; white band does not touch costa except at its two ends.

—*Archips argyrospila*, Walk., variety *mortuana*, var. nov.

Expanse, 18 to 20 mm.

Head dark bronzy-gray, collar shaded with pale ochreous; palpi pale ochreous inside, brown outside, terminal joint blackish; antenna gray; thorax shining-gray; abdomen slightly paler than thorax, tuft whitish-gray; legs ochreous-white, heavily dusted in front with bronzy-black.

Fore wing: Shades of light and dark gray. There is an inner fascia of shining-gray, beginning on costa as a quadrate white spot between inner fourth and third, below costa it widens, and at dorsal margin it extends from inner fourth to beyond middle; in male specimens the dark grayish-brown costal fold partly hides the white spot. There is a similar quadrate outwardly oblique white spot between costa and top of cell beyond middle, below cell it continues as a shining-gray fascia, and overspreads the outer third of wing. A smaller inwardly oblique white spot is on costa before apex; these two white costal spots enclose a darker shade of gray, and in some specimens there is a paler shade connecting the two spots below the dark spot. Cilia pale, shining gray.

Hind wings gray, cilia whitish; under side whitish. Under side fore wing smoky-gray, paler around margins, with costal spots repeated.

Four specimens: Ottawa, Canada, July 3, C. H. Young; New Brighton, Pa., June 20, F. A. Merrick; Wisconsin; San Francisco, Cal. (Strecker collection). I have two other specimens, one from Algonquin, Ill., June 29, Dr. Nason, and one from So. Utah, July, Dr. Barnes, too badly rubbed to include in the type material.

The maculation does not differ from *argyrospila*, but there is a total absence of red, brown or ochreous shades, these being entirely replaced by grays. The variety seems to be as widely distributed as the common form.

Phalonia Hollandana, sp. nov.

Expanse, 13 to 14 mm.

Head, palpi and thorax cream-gray, dusted with light brown; antenna gray; abdomen dark gray, anal tuft dull ochreous; legs cream white, dusted with brown in front.

Fore wing: Basal area cream-white, mottled in the middle with light olivaceous and edged on costa with pale purplish-pink, in which are a few brown dots; its outer margin is nearly straight and very oblique, extending from inner fourth of dorsum to beyond inner third of costa. Beyond it is a black fascia, narrowest on costa, overlaid in middle with purplish-brown, and on lower end with pinkish and cream-white scales; its outer edge is concave, and encloses a large round spot filling the outer third of wing, edged with shining-purple and interior dull reddish-purple, shaded with black outwardly and above. The outer half of costa is purple, interrupted by a black spot before apex, which sends a narrow black fascia into the round spot. There is a black patch in apical cilia, and five others in the termen cilia; between these black spots the cilia is ochreous-pink, and is preceded by a fine black line, before which is a whitish line.

Hind wing blackish-gray; cilia paler, with a broad darker line close to base; under side dark gray, mottled outwardly with black in middle of wing; cilia preceded by a fine ochreous line. Under side fore wing smoky-black, dotted with cream-white on outer half of costa.

Three specimens: Oak Station, Allegheny Co, Penn., Sept. 1, Fred. Marloff; Pittsburg, Penna., Sept. 12 and 21, Carnegie Museum, Acc. No. 2960, through Dr. W. G. Holland, in whose honour the species is named, and to whom I am indebted for the privilege of studying and identifying a large number of most interesting specimens of Micro-Lepidoptera.

—*Commophila contrastana*, sp. nov.

Expanse, ♂, 20 mm.; ♀, 21 mm.

Head and palpi cream-white; antenna, basal joint white, shaded with brown; outer joints light whitish-fuscous; thorax and patagia purplish-black, with an iridescent blue and red reflection; abdomen and legs ochreous-cream, latter shaded in front with brown.

Fore wing: Upper half and outer third cream-white; a sharply-defined band of bluish-black, with an iridescent reflection, as on the thorax, occupies the dorsal edge of the wing. This band begins on costa, covering the inner sixth; it covers the basal area, the outer edge, is outwardly oblique to lower third of wing, where it curves and continues parallel to dorsum; the band is slightly wider at outer end, and terminates before the ocellic space. Paralleling the apex in the outer fourth is a shade of light olivaceous-fuscous, with a cluster of leaden scales before apex, divided into four lines by shining-cream strigulæ from the costa. Between middle and outer third there is a quadrate spot of same shade on costa. Cilia cream-white.

Hind wing light brownish-fuscous, darker around margin; cilia whitish; under side ochreous-white. Under side fore wing light ochreous-brown; shining gray-white below fold.

One ♂, Oak Station, Allegheny Co., Penn., May 23, Fred. Marloff; one ♀, New Haven, Conn., June 7, A. E. Britton.

This species is very closely allied to *C. fuscodorsana*, K., and may prove to be the eastern form of this western species. The dorsal band in *fuscodorsana* sends a spur up to end of cell at its outer end; the strigulations in apex are much darker and limited to two well-defined broader lines. The shade of the dorsal band is fuscous-brown.

Correction.—On pages 5 and 6 *ante* read, "University of Kansas" in the place of "Kansas Academy of Science."

(To be continued.)

around the body in the incision between the second and third abdominal segments. After the girdle is in place, the caterpillar settles into a somewhat crouched position, and then finally arches its body as it awaits the time of ecdysis, several days afterwards. The placing of the girdle occupies about two minutes; if placed too far caudad it is liable to interfere seriously with ecdysis. Unfortunately, no observations were made during pupation, so that the method of placing the girdle by the chrysalis was not seen. Described from 13 specimens.

Duration of Pupal Instars.—The duration of pupal life for fifteen individuals reared averaged 16 days, from June 28th to July 14th, and ranged from 14 to 21 days. The males issued before the females.

NEW MICRO-LEPIDOPTERA.

BY W. D. KEARFOTT, MONTCLAIR, N. J.

(Continued from page 160.)

Cerostoma dorsimaculella, sp. nov.—Expanse, 18.5 to 19.5 mm.

Head whitish-gray, in which are mixed a few dark gray scales; palpi whitish-gray, tuft of second joint clouded with brownish-gray at the outside and at the ends, apical joint dark brown beneath and less so on the sides, whitish gray above; antenna white, annulated with brownish-gray; thorax cinereous-gray, posterior tip whitish, inner edge and base of patagia dark brown; abdomen whitish-gray, anal tuft with a cinereous tinge; legs cream-white, heavily dusted with brownish-black in front.

Fore wing very light gray, with a slight yellowish tinge, strigulated and marked with bronzy-black. The most conspicuous marks are on the dorsal margin, below the fold; the inner is a narrow triangle, with base on dorsum at inner fourth, and apex touching fold at inner third; the outer spot rests on dorsal margin between middle and outer fourth, its upper edge is slightly concave, causing an enlargement at the inner end and a linear extension at the outer end that rises, obliquely outward, above the fold. There are two curved transverse lines from costa, before middle of wing, not reaching fold, beyond them are five shorter costal streaks, before the outer fourth. Below these latter, at the end of cell, is an angulated line, with a few blackish scales above and below it. There are a few dark dots in the line of the middle of the wing, one at base, one a little beyond base, and two near middle of cell. There is a large dark dash in apex, which extends into cilia, becoming paler at the tip. A few dark scales at end of cell, and another small cluster above tornus. Cilia concolorous.

Hind wing paler gray than fore wing, slightly darker around termen, cilia paler, with a faintly darker basal line. Under side the same, a black dot on costa before apex. Under side fore wing darker gray, with a few black dots on costa before apex.

Four specimens, Rounthwaite, Man., July 11 and 12, L. E. Marmont.

Co-type in U. S. Nat. Mus., Cat. No. 9870. I am indebted to Mr. Busck for correcting my generic determination of this species.

Mompha Claudiella, sp. nov.—Expanse, 20 mm.

Head and patagia white, with a faint rosy tinge; palpi white, with a few dark scales on outside of tuft of second joint; antenna fuscous, with a whitish bloom; thorax leaden-black in centre, narrowly edged in front with rosy-white; on posterior half there is a patch of deep rosy-white, and the middle scales at their posterior end are of the same colour; abdomen gray, anal tuft with an ochreous tinge; legs cream-white, heavily shaded with black in front.

Fore wing white, with a faint rosy tinge, shaded with bluish-gray on inner fifth of costa, and a shade of the same colour through middle of wing from inner tuft to end of cell. A small shade of this colour on outer third of costa, and a similar one below it on dorsal margin. The upper half of termen and apex are shaded with gray, in which are sprinkled whitish, black and brown scales; there is a dark brown dot in cilia at apex, and two before apex in costal cilia, and one below apex in the long cilia; the outer ends of the apical cilia are gray, otherwise the cilia is ochreous. The tufts are very large and high; the three most prominent ones are white towards base and ferruginous at their outer ends. There are two close to base of wing, one in middle of wing, and one below it and obliquely outward from it close to dorsal margin; before the latter, and in a streak following the former, are broad black scales; the third is between fold and dorsal margin in middle of wing; it is also followed by a patch of broad black scales from its upper end. There is a smaller but similar tuft at outer fourth of wing, on lower margin, and a small tuft above the third large one on upper half of middle of wing. Below costa, at inner third, is a small tuft of black scales.

Hind wing dark gray, cilia ochreous, the same shade as cilia of fore wing. Under side both wings smoky black, with a whitish streak through middle of hind wing, and the apex of both wings whitish.

Three specimens, Rounthwaite, Manitoba, July 11 and 12, collected by Claud Marmont, whose name I am glad to give to this very beautiful species.

Co-type in U. S. Nat. Mus., Cat. No. 9871.

Mailed June 4th, 1907.

ACTIAS LUNA.

I have been raising several broods of *Actias luna* this year. The prevailing type has very yellow-tinted males, a sort of golden-green, sometimes almost approaching sulphur-yellow, and some of them have the dark lines across the wings very pronounced and strongly undulated. The females are always clear green. I am trying to intensify these peculiarities by selecting the most marked examples to breed from, and as a complete generation requires only about seven to eight weeks during our long summers, results should be quickly attainable.

The species is easily raised in quantity, but is exceedingly rare out of doors. This seems to be due chiefly to the unremitting search for the caterpillars by the large paper-wasps (Polistes). Nothing can exceed the tiger-like ferocity with which these wasps leap upon and rip up and devour one of these great caterpillars—sometimes they bite holes in my cheese-cloth bags on the trees, and a veritable massacre of the innocents follows the entry of one of these murderous creatures. I have seen them tearing furiously with fore feet and jaws at the webs of the tent-caterpillars. They seem to track their prey by scent rather than sight.

A large Cecropia caterpillar put on a branch in the open escaped them for a day or two—Cecropia is not a native here—but very soon I came upon a wasp licking her chops over the last of it, while two examples of a smaller species of Polistes were chewing at the offal like jackals at a tiger's feast. The big wasp ignored them, but snapped viciously at a fly that came for a taste.

Last winter I sent to the CAN. ENT. a modest little advertisement of surplus Luna cocoons for sale. The outcome proves that this journal furnishes to its advertisers, besides sordid lucre, pretty nearly "everything that is requisite and necessary, as well for the body as for the soul," for I sold all my cocoons, and have had a most interesting correspondence and exchange of treasures. One boy in far-off Nova Scotia says I am to be his adopted "Uncle Teddy" henceforward as long as I live, and that he is coming some time to visit me in Florida!

Now, no one can ask more in this world than to have plenty of love and plenty of money (or its equivalent) and an agreeable avocation—the three together are surely "wealth beyond the dreams of avarice"—and all in return for a paltry half-inch of advertising space, at a money-cost too insignificant for consideration!—THEODORE L. MEAD, Oviedo, Fla.

BOOK NOTICES.

KIRKALDY'S CATALOGUE OF THE HEMIPTERA: A PRELIMINARY NOTE.

BY J. R. DE LA TORRE BUENO, WHITE PLAINS, N. Y.

I desire to bring to the notice of American entomologists, more especially to that of our hemipterists, Kirkaldy's Catalogue of the Hemiptera, which will shortly be published by F. L. Dames, of Berlin.

It has been my privilege to read some of the proof-sheets, and I am bound to say that in spite of all the discussion to which it will surely give rise, the work will be indispensable to all systematic zoologists, on account of the phylogenetic matter that enriches it. I reserve to myself the pleasure of going fully into the contents of each volume on its appearance. The first volume is promised to us shortly. But in the meantime I may say that it is far more than a mere list of names, since it gives much biological data and brings all synonymies down to date, clearing up many obscure points. I believe that since Stal's *Enumeratio Hemipterorum* no work of a similar nature has covered the field so completely, excepting, perhaps, Wytsman's "Genera Insectorum," which, however, is different in scope and plan.

THE GENERA OF THE TORTRICIDÆ AND THEIR TYPES. By C. H. Fernald, A. M., Ph. D., published by the author, Amherst, Mass. Signatures issued as dated February 21st to May 29th, 1908; issued complete June 4th, 1908; 68 pages.

The fathers of entomology who did such conspicuous work in the last quarter of the eighteenth and the first half of the nineteenth century, usually omitted to designate any certain species as the type of or typical of their genera. Their conception of a genus was also based upon superficial characters, such as the pattern and ornamentation of the wings, and it was naturally found, when the present systematic structural scheme was adopted, based upon venation and other fixed characters, that in many cases under one genus were many different structures.

This has been the cause of endless confusion and changing of generic names, especially during the past twenty-five years, when the systematists in different groups have endeavoured to live up to the severe letter of the law of priority. The confusion has been only increased by the

different interpretations and different methods pursued by investigators as to the manner of fixation of types. Professor Fernald in this work states that he has followed the latest rules as prescribed by the highest International Authorities, and adopted at the last meeting of the Zoological Congress.

This work is the first of its kind that has ever been published in the Microlepidoptera. As its title implies, it takes up one by one every Tortricid genus known to the author, from the tenth edition of Linnæus down to the present day, and fixes and names the type species in each genus. The fact that about three hundred and twenty generic names are reviewed, indicates the magnitude of the task. Other authors have made desultory attempts from time to time to fix types in the particular genera in which they happened to be working, but it remains for the present author to treat the entire family of Tortricidæ as a comprehensive whole.

As the author states, there will naturally be a difference of opinion as to the flexibility or limitations of structure which constitute a genus. For this reason the synonymy of genera which concludes the work will be subject to change. This remark is emphasized by the fact that with two exceptions the synonymy is exactly the same as the list of species under the different generic headings in Staudinger & Rebel's 1901 Catalogue. Very little work in the European Tortricidæ has shown that the groups in this catalogue are not well assorted, and are subject to very considerable revision.

The North American and European genera appear to have been most conscientiously worked out, but it is apparent that little or no work has been done in the Indian and Australasian genera, as all of these latter are simply listed without criticism or indication that any attempt has been made to associate them with the older genera. As many of the Eastern genera have been erected on more or less unsubstantial secondary sexual characters, some of them will certainly fall into the synonymy when their structure is better known.

These criticisms do not affect the value of the work, as it only purports to fix the type of the genera, and in doing this it confers a vast benefit on all workers in this group.

The next step must be the publication of a work, containing plates showing the venation and other structure of every type species named in Professor Fernald's monograph, together with the synopsis of the characters

of each genus. Of course, this must be followed with an examination of every known species of the world's Tortricidæ and a reassemblage of them under their proper generic headings.

As it necessarily must be some years before such a work can be completed, the status of generic names in our present list is of interest. The most important changes are shown in the following table, the first column of which gives the names to be substituted for the supplanted names of the American lists in column two, and the European list in column three. It may be added that this table but briefly shows the changes made necessary in the European lists. About half of their present generic names will go into the synonymy and be replaced by older names.

Fernald's Revision.	*Dyar Cat., 1902.* / *Smith List, 1903.*	*S. & R. Catalogue, 1901.*
Rhyacionia, Hb.	Evetria, Hb.	Evetria, Hb.
Cymolomia, Led.	Exartema, Clem.	Cymolomia, Led.
Olethreutes, Hb. / Argyroploce, Hb.	Olethreutes, Hb.	Olethreutes, Hb.
Cydia, Hb.	Thiodia, Hb. (Dyar) / Cydia, Hb. (Smith)	Semasia, Hb.
Enarmonia, Hb.	Epinotia, Hb.	Steganoptycha, Stph.
Spilonota, Stph.	Tmetocera, Led.	Tmetocera, Led.
Ancylis, Hb. / Anchylopera, Stph.	Ancylis, Hb.	Ancylis, Hb.
Laspeyresia, Hb. / Eucelis, Hb.	Enarmonia, Hb.	Grapholitha, Tr.
Carpocapsa, Tr.	Cydia, Hb. (Dyar) / Carpocapsa, Tr. (Sm.)	Carpocapsa, Tr.
Peronea, Curt.	Acleris, Hb.	Acalla, Hb.
Æthes, Billbg.	Phalonia, Hb.	Conchylis, Sodoff.

As the author remarks in the Preface, his work is incomplete. This refers particularly to certain of Walker's names of exotic genera, which have not been systematically investigated, and likewise to the names in the Billberg Enumeratio. In both of these works genera were included under the heading of Tortricidæ, which belong to other families. Most of these have been treated by the author, but it is only reasonable to suppose that likewise in other families may be found genera based upon Tortricids, which may supplant some of the names re-established in this paper.

W. D. K.

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NEW NORTH AMERICAN TORTRICIDÆ AND TINEINA.

By W. D. Kearfott,

Montclair, N. J.

Eucosma dorsisuffusana, new species.

Expanse 17.5–24 mm.

Head dark chocolate-brown, face blackish; palpi cream-white inside, dark bronzy-brown outside, apical joint short, obtuse, dark gray; antenna blackish gray, faintly annulated with whitish; thorax dark gray-brown mottled with ochreous brown; abdomen light fuscous; legs cream-white, shaded with ochreous brown and dark brown.

Forewing. — Inner third and upper half transversely strigulated with grayish brown and black, with a shade of bright brown between the black lines before the dorsal spot and on the outer half of costa. The lower half of wing, from inner third to termen is cream-white, the usual dorsal spot running into the white ocellic area, the latter reaches to within a quarter of the costa, and is rounded on top; the brown ground color sharply defines this white area and by an angulation downward at outer third outlines the upper side of the two spots. Before the ocellic space are a few dark brown scales on the white ground. Between middle and apex the costa is marked with five pairs of outwardly oblique cream-white dashes, each ending below costa in a few light blue metallic scales, from the second pair before apex the line of metallic scales continues to termen, a third below apex; between these costal

streaks the ground color is bright ochreous brown, this shade narrowly margining upper half of termen. There is a small white dot on termen immediately below apex. Cilia on upper half light ochreous brown, mottled with darker brown and gray, with a few black scales in apex, the lower half, opposite white ocellic area, is white.

Hindwing. — Light smoky brown, cilia cinereous, preceded by a gray line; underside the same. Undeside forewing darker smoky brown, costal spots faintly repeated.

Ten specimens, Cincinnati, Ohio, June 6–23, Miss Braun; Pittsburg, Pa., July 3, Henry Engel. Cotypes in Merrick Museum, Miss Braun's and my collections.

This species is like *similana* Hbn. (Europe) and has been frequently so named. The wings are narrower and the arrangement of costal spots and dorsal patch different. In shape and general appearance *dorsisuffusana* is more like *otiosana* Clem.

Eucosma medioviridana, new species.

Expanse 16–17 mm.

Head, palpi, antenna and thorax light mouse-gray; apical joint of antenna blackish brown; abdomen light fuscous; legs whitish, shaded with gray in front.

Forewing. — Outer two thirds pale apple green, inner third conspicuously darker. The basal area at middle of wing extends to inner third, its outer edge is a black line, obliquely outward from costa to middle, thence inward to dorsum with an indentation between fold and dorsum; there is an inwardly oblique line in the middle of this space, beginning at costa and ending below fold, this starts as outwardly obliqne on the ♂ costal fold, then turns inward. Between costal fold and lower median vein, is overlaid with darker apple green, on a dark gray ground, below it is mottled gray and brown, this is succeeded in the outer half of the basal area by a patch of light ochreous brown, widest on dorsal margin and tapering to a point at upper third. Beyond the basal area the balance of wing is pale gray, more or less heavily overlaid with pale apple green, this color is most pronounced in the middle third of wing. It is traversed by faint irregular darker lines from the costa; two from beyond middle of wing enclose an obscure narrow dark gray fascia to tornus; half way between this and an apex an irregular line circles the outside of ocellic space, the latter is not defined. Cilia dark gray.

Hindwing. — Brownish gray, underside the same; underside forewing dark smoky gray.

Six specimens, Ottawa, August 17–21, C. H. Young; New Brighton, Pa., August 25 to September 11, H. D. Merrick and Henry Engel. Cotypes in Merrick Museum, Young's and my collections.

This species, in the shape of the wings and general markings, is very similar to *pulsatillana* Dyar, it can be separated by the green shading, which is absent from *pulsatillana;* I would place it between the latter and *nisella* Clerck.

Eucosma engelana, new species.

Expanse 14–17 mm.

Head, palpi, antenna, thorax, abdomen, legs and forewings pale terra-cotta brown. The inner sides of palpi are slightly paler, also hindwings are of a lighter shade.

Forewing. — A faintly darker basal shade, its outer edge from inner third of dorsal margin obliquely upward and becoming obsolete near costa. Before tornus is the only conspicuous mark on the wing, a darker brown quadrate spot, resting on dorsal margin and disappearing before middle of wing. The intervening space, between it and basal area, and also the ocellic area is slightly paler than the balance of wing. On the outer half of costa are several faintly darker outwardly oblique dashes, the one before apex is inwardly oblique. The intervening spaces paler.

Four specimens, three ♂ from Pittsburg, Pa., August 20 and September 2, Henry Engel; one ♀ Great Notch, N. J., 800 ft. elevation, May 21, 1899. Cotype in Merrick Museum, and my collection.

This species is very much like *dorsisignatana* Clem., and I have long considered my ♀ specimen as a very pale or bleached form of this species; recently, when at New Brighton, Mr. Engel showed me three ♂ specimens and insisted they were distinct from any of the varieties of *dorsisignatana*, in which opinion I entirely coincide, after additional critical comparison, and take pleasure in naming the species after this most careful worker.

Eucosma galenapunctana, new species.

Expanse 17–24 mm.

Head ochreous cream, darker in front; palpi with small rounded flattened brush on second joint, apical joint short, exposed, color ochreous cream, outer end of brush and apical joint leaden-gray; antenna finely ciliated in male, ochreous cream faintly annulated with gray; thorax same shade as posterior end of head; abdomen grayish white becoming darker at anal end; legs creamy white, dusted with brown.

Forewing. — Male costal fold about one third length of wing, narrow, appressed, costa nearly straight beyond base, apex obtuse, rounded, termen very slightly concave; venation both wings typical, pale ochreous-cream, with horizonal rows of blackish leaden dots, in certain light these dots are black, in others no trace of black but shining gray, when rubbed the dots are more or less obsolete and of a brownish shade; the costa is narrowly dotted on the inner half with light to blackish brown, on outer half the dots become outwardly oblique brownish streaks, separated by whitish lines, the latter in outer third connect below with shining streaks that run into the vertical bars on each side of the ocellus. On the inner third of wing, between costal edge and upper vein of cell, is a streak almost free from these dots; between the clear streak and fold are three rows, below the fold are three or four irregular and broken rows. The ocellus is on a cream ochreous field, with a strong inner bar and a broken outer bar, between which are three fine horizontal black lines, the two upper ones are longest, they all touch the inner bar and in some specimens the inner end of the black lines are enlarged. Costa whitish ochreous, speckled with black at base.

Hindwing. — Pale fuscous, darker around margins, underside paler. Underside forewing creamy ochreous, thickly overlaid with blackish brown, costal dots and dashes repeated; cilia not speckled, outer half whitish.

Twenty-one specimens, Denver and Clear Creek, Colorado, July 17 to August 28, collected by E. J. Oslar, four specimens from Dr. Barnes and two from Mr. Busck's collection.

Cotypes, Cat. No. 11,936 U.S.N.M., in Dr. Barnes and my collection.

This species is close to *graciliana* Krft. and *albiguttana* Zell., the former is similarly dotted on forewings but each dark dot is on a larger white dot; the latter is a very much smaller insect with the dots less in number but proportionately larger in size.

Eucosma grotiana, new species.

Expanse 15–22 mm.

Palpi and head very dark cream or very pale fawn, former shaded with brown externally; it is flattened, upcurved with long scales on underside forming a round tuft extending 1½ times eye-width beyond head, apical joint concealed; antenna dentate, light ochreous, a small dark brown dot on basal joint internally; thorax white with two transverse dark brown bars across patagia, near anterior and posterior ends similar bars across thorax at middle and before posterior end; abdomen and legs dark cream, latter dusted with brown.

Forewing. — White, with brown markings; the basal area is white with a curved line of brown scales from dorsum to costa, beyond is a narrow white area succeeded by a broken brown fascia at inner fourth which outlines the usual basal area, this is sharply angulated outward at middle of wing, and is obsolete on costal third. A prominent brown fascia, starts from middle of wing, curves outward with edges irregular to dorsum before tornus where it is widest. Before the apex is an irregular brown cloud, the upper larger part ovate, with an outer limb running into termen below middle and an inner limb as several black dots passing through center of ocellus; there is a faint line from its upper inner edge connecting with a costal spot at outer third. Above the cloud is a small patch of leaden scales. The costa is marked by a brown apical spot and two others above the cloud, the middle one the largest, each contains fine darker brown lines, and the white interspaces are divided by short brown lines. The male costal fold is smoky brown, with two dark brown spots and a paler one at outer end, between this and main costal spots are similar short brown lines or dashes on costa. There are several dark dots on middle of dorsal margin. The brown fascia and spots are usually outlined with blackish brown on their edges. Cilia, internally, gray speckled with brown, outer ends white.

Hindwing. — Light smoky brown, cilia whitish, with a broadly darker basal shade; underside the same. Underside forewing brassy brown, with light and dark costal and apical marks repeated.

Fifteen specimens, Chicago, July; Ames, Iowa, and Iowa, latter specimens labelled, "Ac. Cat. 118–121–267 C. P. Gillette"; Colorado

Nos. 628 and 2,610; Denver, Colo., June 22, Clear Creek, Colo., July 16–23; Bear Creek, Morrison, Colo., August 23, Oslar; Pecos, New Mexico, August 25, at light, Cockerell.

Cotypes, Cat. No. 11,934 U.S.N.M. and my collection.

I have long had this species in my collection under *E. matutina* Grote and have doubtless so named it for correspondents; but a careful reading of Grote's most imperfect description, in which even the expanse is omitted, and examination of his figure, as well as examination of a specimen determined by Dr. Fernald, who was acquainted with Grote's type, before his collection was sold to the British Museum, convinces me that this large, showy species is distinct. The brown of the marking of *matutina* is much paler and more of a fawn shade, but the easiest marks of separation are the brown spots on antennæ bases of *grotiana* which are entirely wanting in *matutina*; in *matutina* on the white space between apex and fascia is a darker lance-like shade that connects with the latter, but this latter may occur on very dark specimens of *grotiana*, hence is hardly a good character. My conception of the expanse of *matutina* is 12–16 mm., much smaller in average size than *grotiana*.

Eucosma costastrigulana, new species.

Expanse ♂ and ♀, 17–18 mm.

Head light ochreous brown; palpi whitish ochreous, rather loosely scaled above and below on second joint, tuft flattened, triangular; apical joint darker, very short, obtuse, almost hidden; antenna ♂ very finely ciliate, gray; thorax light ochreous brown, patagia and posterior end mottled with white; abdomen bleached straw or same shade as palpi and hindwings; legs pale ochreous, anterior pair shaded in front with blackish brown, and all tarsi ringed with same color.

Forewing. — Light ochreous brown or yellowish ochreous, shaded with darker brown on costal edge; this brown edging is interrupted from base to apex by white dashes or strigulations, these also cover the ♂ costal fold; there are four pairs before the middle and four pairs beyond the middle, the latter are more sharply defined than the former, the outer dash of each pair is usually longer than the inner, the first pair beyond middle sends a scattered line of white scales to inner bar of ocellus and a few leaden scales continue from the second and the apical pair. In the apex is a rounded white spot, its outer half resting on the cilia, it contains a few dark brown dots; a similar whitish ciliate spot is just above tornus opposite ocellus. Before the ocellus the wing is more or less speckled with white. Ocellus is well-defined, with two or three rather long horizontal black lines, vertical bars are shining whitish with a small dot of same color below, in tornus; before the inner bar are a few scattered black scales. Cilia, inner half whitish gray, finely atomized with black, and interrupted above tornus and in apex as stated, outer half shining pale ochreous. Underside grayish fuscous, with costal spots repeated.

Venation typical of *Eucosma*.

Described from four specimens, San Diego, Cal., July 8 and 10, collected by G. H. Field and bearing sub-labels "Tallys" and "Julian." I have also before me three other specimens labelled San Diego, Cal., July 27, W. S. Wright, that are very much whiter than the above, which I have no doubt are the same species, but bleached and rubbed from their longer exposure..

Cotypes, Cat. U.S.N.M. No. 11,932, and my collection.

Eucosma sandiego, new species.

Expanse ♂ 25–27 mm., ♀ 27–28 mm.

Head light ochreous brown; palpi short, projecting scarcely half eye-width beyond head, brush compressed, concealing third joint, externally ochreous brown, internally whitish; antenna flattened laterally in male, serrate and finely ciliate, whitish brown; thorax brown, posterior end white; abdomen whitish fawn, the two anterior joints above white; legs whitish fawn, shaded with brown.

Forewing. — Rich chocolate-brown, marked with silvery white spots, which occur as follows: An irregular median streak from base to inner fourth, principally above fold, but sending a short spur, at its outer end along fold; beyond, before middle, is a quadrate spot in middle of wing; beyond this are two spots, one smaller, ovate in shape, is between tornus and lower angle of cell, the upper one elongate, resting beneath costa between middle and outer fourth; above its outer attenuated end is a small dot on costa; just before apex is an inwardly curved streak, sometimes divided by a line of ground color so that a dot forms at its inner end; just below apex is a smaller similar streak, below which three or four dots margin the termen to tornus, all of the spots are more or less distinctly outlined with darker scales. The dorsal edge is narrowly lined with silvery white from base to outer fifth. Cilia light brown, speckled with whitish.

Hindwing. — Pale fuscous, cilia whitish, with a slightly darker basal shade. Underside light ochreous gray; underside forewing ochreous brown, with the spots of upper surface indistinctly repeated in an ochreous shade.

Light form; marked as above but ground color is light ochreous brown or pale fawn; head, thorax and other parts of the same shade. The male costal fold is dark brown in the dark form and dark fawn in the light form, it is short extending only to inner fourth.

Four specimens, two males and two females, one pair of dark form and one pair light form. San Diego, Cal., September 15–29, George W. Field; Walters St., Cal., April, from J. B. Smith. Cotypes ♂ and ♀, Cat. No. 11,930 U.S.N.M. and in my collection.

This species is closer to *ridingsana* Rob. than any other of the silvery spotted *Eucosma's;* it can be separated by the median line, which in *ridingsana* is continuous from base to beyond middle of wing; the silvery costal streak, on inner half of wing (absent on male fold) of *ridingsana* is entirely absent in *sandiego;* the terminal line of dots of

sandiego is also a distinguishing mark. There is a certain amount of variation in the spots of *sandiego* as in *ridingsana*, in fact in both species, seldom are the two wings replicas of each other. The occurrence of both sexes of both the brown and ochreous form is interesting and if there were not such uniformity in the spots and markings I would be inclined to think there were two races.

Cydia granulatana, new species.

Expanse 15–18 mm.

Head, palpi and forewing greenish-yellowish white, the color can better be understood by saying it is white with a greenish yellow tinge. Thorax same color but a trifle more yellowish, a few brown scales at base of patagia; antenna dark fuscous but this dark shade almost hidden by greenish white pubescence; abdomen shining, whitish fuscous; legs same shade as thorax, tarsi annulated with brown.

Forewing. — Ground color as stated, almost evenly throughout covered with vertical dashes of dark brown, giving a granulated appearance; under a lens these dashes are in four principal horizontal rows, the upper marks the costa evenly from base to apex, in the row below costa the dashes are smaller than in the dorsal row and the one above it, in some specimens in these two lower rows, especially the dorsal, there is a tendency of the dark color to run together on the inner two thirds below the fold. The ocellus is practically free from the dark dashes, containing only a few scattered blackish dots, it is bounded on both sides by shining whitish bars, and there are a few scattered shining scales from outer third of costa to inner bar, and similar shining scales on costa before apex, between the brown dashes. Cilia whitish, speckled, a brownish basal line.

Hindwing. — Gray, cilia whitish, with a darker basal band; underside the same and with a few darker scales in apex and along costa before apex. Underside forewing greenish gray, costa whitish on outer half with dashes repeated.

Thirteen specimens, Platte Cañon, Colorado, August 23; Denver, Colorado, September 4; Boulder, Colorado, all collected by E. J. Oslar; Colorado, No. 2,298, from U. S. N. M.

Cotypes, Cat. No. 11,935 U.S.N.M. and in my collection.

Steganoptycha bolliana Slingerland (Pl. II, Fig. 1).

Steganoptycha bolliana Sling., Rural New-Yorker, p. 401, June 13, 1896.

This species is very closely allied to *diludana* Clem., in fact from the latter part of Clemens' description, Proc. Ent. Soc. Philada., III, 513, 1864, it is likely that he also had the species before him, as he writes: "In another specimen the markings of the forewings were of a more pronounced blackish brown, especially in the middle of the wing and the curved streak near the tip of the wing is somewhat obscured by a blackish brown patch that adjoins it." I am not aware of any breeding record of *diludana*. In the South, where the pecan

grows, *bolliana* lives upon its leaves, but I have undoubtedly the same species from western Pennsylvania, in addition I have certainly seen others from various parts of New Jersey and New York State; as these Northern States' species cannot live on pecan, I have no doubt their larvæ will be found on one of the closely allied hickories.

Bolliana is much darker than *diludana*, the character by which it can be most easily separated is a black streak from middle of base to apex, which by an enlargement in basal third, another beyond middle and another before apex, represents three steps, or three large black spots connected by finer lines. The gray ground color has a greenish tinge, the dark marks have more of a mottled appearance than linear as is the case with *diludana*. The hindwings are dark, smoky brown, while in *diludana* they are light gray. The venation of both species is the same, it is shown by Fig. 1, Pl. III.

I have before me Professor Slingerland's original specimen, from which the cuts and remarks, establishing the specific name, were drawn, and by his courtesy am able to reproduce them below.

Through the courtesy of Professor Chittenden I have examined the following bred material in his possession: No. 2,848, on walnut, issued October, 1898, District of Columbia; on pecan, issued October 22, 1907, Washington, D. C., H. O. Marsh; No. 2,848, on pecan, issued August 12, 1898, Seabrook, So. Car.; pecan, issued April 21, 1906, and June 2, 1905, Waco, Texas. Also the following flown material: Washington, D. C., resting on trunk of pecan, September 30, H. O. Marsh, collector; (Chittenden) Oak Station, Allegheny Co., Pa., June 12–24, September 7, Fred Marlof; Pittsburg, Pa., August 19 to September 29, Henry Engel; New Brighton, Pa., September 5–17, F. A. Merrick.

The type of the species, so labelled, is in the Cornell University Collections, Ithaca, N. Y., and bearing serial label "C. U. Exp. No. 548, sub.— 18 April '96"; compared specimens, homotypes, are in my collection.

I am indebted to Professor Chittenden for calling my attention to Professor Slingerland's article, which seems to have been entirely ignored by our calatogue makers.

A NEW DESTRUCTIVE INSECT ON PECANS (Rural New-Yorker, June 13, 1896, p. 401). C. E. P., Ocean Springs, Miss. — "I send some worms found on my pecan trees. The dark brown one spins a cocoon, works into the young buds as soon as the outer covering is

thrown off, and destroys the bud. Does it not belong to the Elater family? It seems to have two broods, one now, and the other in July. Or do they change from the small cocoon around the buds to the partly grown leaves, and form another cocoon? Or does the latter belong to a later brood? In the fall, the undersides of the leaves of some trees are fairly covered with their houses, but then I can kill them by spraying, as they feed on the leaves. What I want, is to get at them in the spring. Can it be done? The second white worm, with a dark head, works into the new growing shoots, and will destroy the fruit if it gets too plentiful. How can I get at it, as it is working inside the young shoots going down? Can you give me the history of both, as they develop into a serious pest?"

ANSWER BY M. V. SLINGERLAND: "The material sent by C. E. P. consisted of several opening pecan buds webbed together; two kinds of small caterpillars, one light green in color with black head and neck, the other dark brown, with similar black head and neck; and several pupæ inclosed in cocoons made by webbing the leaves together, as shown at *a* in Fig. 133. Judging from the appearance of the buds sent, the insects were doing very serious injury. The material was placed in some of my breeding cages at the insectary, and in a few days, there emerged from the pupæ some pretty little gray moths with blackish markings; two of them are shown natural size at *b* in Fig. 133. As we had nothing like them in our university collection here, one was sent to an expert for its name. His reply was that he had labeled the same insect in his collection, *Steganoptycha bollina*. His specimen came to him from Texas several years ago, but the name has never before been published; so C. E. P.'s pecan bud worm proves to be new to science. The moth is, probably, the parent of the green worm.

"I failed to breed the brown caterpillar which seems to work very similarly to the bud moth of our New York apple orchards. The early appearance of the moths, April 18, would indicate a second brood of the worms during the summer. Neither of the worms which I found in the material sent, has anything to do with the elaters or snapping-beetles; all were the caterpillars of small moths.

"Information about this new insect is so scanty that no definite advice can now be given as to the best time and manner to fight it. C. E. P. thinks that he can control it later in the season, and if this be true, it ought very materially to lessen the numbers to appear on the

buds in the spring. It is an extremely difficult matter to poison worms working on the opening buds of trees, for, as the leaves unfold so rapidly, new unpoisoned pastures are being constantly opened for them. I think, however, that two very thorough applications of Paris-green water, as strong as the trees will stand, while the buds are opening, would materially check these pecan bud worms."

Steganoptycha bolliana. (From Rural New Yorker.)

Epinotia piceafoliana, new species.

Expanse 9.5 to 10.5 mm.

Head light gray, tinged with yellowish on top; palpi short, scarcely extending beyond head, tuft small, flattened, the scales at outer end not concealing the short, obtuse outer joint, color gray, shaded with blackish on outside, apical joint dusky black; antenna gray; thorax light cinereous gray, with a bronzy median shade; abdomen bronzy black, anal tuft gray-ochreous; legs gray, heavily dusted in front and tarsi ringed with bronzy black.

Forewing. — Costa nearly straight, slightly curving at base and apex, termen straight and only slightly oblique. Twelve veins, all free, accessory cell large, beginning midway between 10 and 11, outer end opposite 7; internal vein ending opposite 5. Color grayish white, crossed with blackish brown lines and narrow fasciæ. The basal area is defined by a heavier dark dentate line, from inner fourth of costa, curving outwardly to inner third of dorsum; before this are three or four parallel fine dark lines

on a gray-white ground, each starting with a blackish costal dot. From middle of costa to before tornus is a narrow dark fascia, interrupted by a white oblique line on middle of cell, below which an obtuse spur of the dark color on the outer edge of fascia. Between this fascia and basal area is a broad fascia of ground color traversed by broken dark lines, and on costa forming two white spots, each usually divided by a blackish dot. Beyond the dark fascia, the apical third is whitish gray, crossed by parallel dark line, starting as black costal dots and separated by four white costal spots. The apex is black and defined below by a white dash through the black terminal line and extending to outer edge of cilia. Ocellus not defined. Cilia dark leaden-gray.

Hindwing. — Smoky black, cilia dark gray, with a darker basal line. Eight veins, 3 and 4 stalked. Underside both wings dark smoky gray, costal spots repeated on forewing, and the latter grayish white below fold.

Twenty-eight specimens, Montclair, N. J., June 1 to 5, some bred from larvæ feeding on the needles of black spruce, *Picea mariana;* others taken resting on the twigs or flying about the same trees; Cincinnati, Ohio, May, 15, Miss Braun.

The mature larvæ are about 6 mm. long, robust, yellowish green. Head, p. t. shield and thoracic feet black. They mine the needles in the same manner as the larvæ of *Recurvaria piceella* K. When full grown they spin a dense white cocoon between the needles, close to the twig. I have taken the larvæ the first warm days of spring in April and early May, and they have pupated as early as April 28 and as late as May 18. Breeding number K. 510. In size and coloration this species is very much like *Eudemis vacciniana* Pack.[1]

Enarmonia articulatana, new species.

Expanse 13.5 mm.

Head and thorax bronzy black, minutely dotted with fuscous; palpi whitish inside, shaded with fuscous outside; posterior ends of patagia white; abdomen fuscous, banded with white beneath; legs whitish, front tibiæ annulated with black.

Forewing. — Velvety blackish brown. The inner fourth is overlaid with shining olivaceous gray, beyond this the lower two thirds and apical fourth are finely and evenly dotted with pale olivaceous-ochreous. On the middle of dorsal margin is a brilliant white spot, slightly wider than high; its upper edge connects with an oblique narrow fascia from inner third of costa, which is shining in the middle of wing, and whitish on costa where it is also germinate. A narrowly, very slightly germinate

[1] Since the above was written, I have received a series of the European species *Steganoptycha nanana* Tr. and careful comparison suggests that the two are identical. Meyrick in Hand Book of British Lepidoptera, p. 474, states that the larvæ of *nanana* are brown, with black head and plate, feeding on *Pinus abies.* It is not impossible that future observation may prove the identity of the European and American forms, especially as the species could be easily introduced, attached, in one of its stages to imported trees.

line starts from costa between middle and outer third, which runs to inner vertical ocellic bar. A short oblique streak is beyond and close to this, on costa and close to apex are two short white streaks, the inner one the longer and outwardly curved. The ocellic space is finely atomized with olivaceous cut by several horizontal black dots and lines, a line below, above it a dot, then another line (at about the middle of wing) above which are three superimposed dots, slightly inwardly oblique, to upper fourth of wing, between two white costal dashes; the ocellic spot is bounded on either side by a vertical shining metallic bar. The only spaces on the wing of the velvety brown-black ground color, free from the olivaceous atoms, are on upper two fifths, in the middle of wing, between the two prominent costal streaks, on the inner edge of the inner costal streak and on both sides of the white dorsal spot. Cilia shining fuscous, preceded by a fine black line.

Hindwing.— Whitish at base shading with dark brown outwardly, cilia whitish; underside the same. Underside forewing plumbeous brown, costal spots lightly repeated.

Two specimens, Cincinnati, Ohio, April 30, Miss Braun; New Brighton, Pa., H. D. Merrick, June 5. Cotype in Merrick Museum, and my collection.

Enarmonia multilineana, new species.

Expanse 13–14 mm.

Head hoary black, mixed with white scales in front; palpi white, outside of median joint and apical joint shaded with light fuscous; antenna white, annulated with grayish fuscous; thorax mottled gray; patagia whitish posteriorly; abdomen cinereous gray; ♂ claspers whitish outside, yellowish inside and narrowly edged with fuscous posteriorly; legs whitish, annulated with dark fuscous.

Forewing. — Dark grayish fuscous, with many whitish, outwardly oblique, lines from costal and dorsal edges. A pair of these lines, from costa before middle, in the middle of wing, meet a pair from inner half of dorsal margin; the apex of this junction is half way between base and outer margin; before these lines the basal space is nearly uniformly of the mottled ground color, but indistinctly dotted with whitish on both costal and dorsal edges. Succeeding these lines is a darker fascia of about their width on upper half of wing but increasing to double the width on dorsum. Beyond this is a broken pair of whitish lines, from costa into ocellic spot. Between the latter and apex are three pairs of white costal dashes, the interspace of each pair is a darker, black shade, sending line of this color into termen. From the inner, of the middle pair of costal dashes, a faintly blue metallic line runs to the termen below apex, where it ends in a white patch in the cilia. A similar white cut occurs in the cilia above the tornus and another one below it; these last two are connected together by a white streak within the narrow black preciliate line. Ocellus gray, with three short horizontal black bars, bounded on either side by vertical bars of faintly blue metallic scales. Cilia, except as noted, shining leaden fuscous.

Hindwing. — White internally, edged with dark fuscous, narrowly at base and broadly at apex; cilia whitish. Underside the same. Underside forewing dark gray, with whitish costal and ciliate lines repeated.

Four specimens, Aweme, Manitoba, May 16, June 26 and 29,

Norman Criddle; Miniota, Minn., Merrick Museum. Cotype in Merrick Museum, and my collection.

This species is close to *garacana* Krft. but can be easily separated by the white hind wings.

Tortrix triangulana, new species.

Expanse 14.5–15.5 mm.

Head whitish gray speckled with light fuscous; palpi externally same as head, internally whitish, apical joint fuscous at base, tipped with whitish; antenna, male ciliated, about 1, light gray annulated with darker fuscous; thorax speckled blackish brown, posterior end and patagia tipped with cream-white; abdomen light gray, anal joint ochreous gray; legs cream-white dusted with brown.

Forewing. — Grayish white with a yellowish tinge, strigulated and marked with blackish brown. The most prominent mark on the wing is a large blackish triangle, with nearly even sides, resting on costa beyond middle, its lower point extends to middle of wing. There is an obscure basal area on inner fourth, blackish along costa and dorsal margins and with two wavy dark transverse lines. On costa between triangular spot and apex are two quadrate spots, the outer one the larger; the apex is gray enclosed with a fine dark line. The balance of wing is gray with vertical darker lines, one between basal area and triangular spot, a waving line connecting lower point of triangle with dorsal edge and two or three irregular lines beyond. In the inner half of wing, especially on and adjoining the fold, the dark lines are outlined with ochreous scales. Cilia concolorous.

Hindwing. — Smoky fuscous, cilia same with a paler basal line; underside whitish gray vertically strigulated with brown. Underside forewing dark smoky fuscous, with whitish geminate costal spots.

Described from three males, one from San Francisco, two from San Diego, California, July 27–31, collected by W. S. Wright, and received through U. S. National Museum.

Cotypes, Cat. No. 11,933 U.S.N.M. and in my collection.

Of the San Diego specimens one is very badly rubbed, the other, in fair condition, is much whiter and the markings blacker than the San Francisco specimen. It is nearest to the very strongly and somewhat similarly marked *T. lomonana* Krft.

Phalonia punctadiscana, new species.

Expanse 12–13 mm.

Head cinereous gray, speckled with fuscous; palpi light gray within, shaded with fuscous externally, apical joint short, blunt, black, tipped with gray; antenna dark fuscous; thorax cinereous gray, broadly mottled with brown-fuscous; abdomen dark gray, tuft cinereous; legs yellowish white, anterior pair shaded with dark brown.

Forewing. — Light olivaceous gray on inner half of wing, heavily speckled with darker gray, especially along basal third of costa; the basal area is not defined, but that part of wing is clouded with darker scales. There is a well defined reniform spot of light brown in middle of wing, the upper end resting on costa, it reaches to

fold, its inner edge is sharply incised above middle, the outer edge is convex, with an obscure spur pointing toward costa from its middle. There is a similar brown shade between end of cell and termen, with a narrow projection touching costa at outer fifth, below costa it is much enlarged and rounded with two obscure spurs touching termen about the middle; both of these brown shades are horizontally streaked with darker brown on the middle of wing, and edged with black on the inner one, forming a conspicuous dark discal streak, the space between them, or upper half of wing is silvery gray, overlaid with pink; costal edge of outer half narrowly yellow, with two fuscous dots between the brown shades and two larger ones between the outer shade and apex. Cilia concolorous, with a darker basal line and a paler spot at end of each vein along the termen.

Hindwing. — Cinereous gray lighter basally, underside light cinereous, with vertical fuscous reticulations on outer half. Underside forewing, smoky fuscous, with a fine light line before cilia and the latter spotted with whitish.

Five specimens, Oak Station, Pittsburg, Pa. (Fred. Marloff), July 29 to August 8. Nearest *P. nonlavana* Krft. most easily distinguished by the dark, horizontal discal streak.

Commophila? umbrabasana, new species (Pl. III, Fig. 2).

Male. — Expanse 14–17 mm., female 20 mm.

Head pale ochreous; palpi darker and shaded externally with brown, extends beyond head nearly twice width of eye, second joint tufted above, flatly triangular, scales rather compressed; apical joint very short, obtuse, light brown, paler at tip and with a few darker scales at its base; antenna, basal joint enlarged with compressed scales, brown on basal half, pale ochreous outer half, beyond basal joint it is ciliated on lower side, ciliations 1, color whitish brown; thorax brown, same shade as basal sixth of forewing; abdomen light grayish ochreous; legs same color, heavily dusted with blackish brown, posterior tibiæ tufted below.

Forewing. — Very pale fawn, or light ochreous brown, vertically strigulated with dark brown, these dark scales tend to form a more or less well-defined triangular dorsal spot, beyond middle, sharply defined above by outer end of fold; in some specimens the inner and outer edges of the spot are heavily overlaid with leaden metallic. The basal sixth is brown, with a bluish irridescent hue in certain lights. The costa is lightly marked by the darker strigulation, four spots on outer third are the most distinct. Above the dorsal triangular spot is a conspicuous brown dot, on the lower angle of cell, this is absent on specimens that are slightly rubbed. In some specimens the apical third is heavily strigulated with grayish fuscous, this shade margining both costal and dorsal edges to before middle. Cilia light ochreous yellow.

Hindwing. — Above and beneath light grayish ochreous. Underside forewing shining, light coppery brown.

Described from ten specimens, three from San Diego, Cal., May 6, collected by W. S. Wright; one Colfax, Placer Co., Cal., December, collected by A. H. Vachell; six, Alameda Co., Cal., June 17, collected by G. R. Pilate, for Miss Braun.

Cotypes, Cat. U.S.N.M. No. 11,931, Miss Braun's and in my collection.

This species is placed temporarily under *commophila* as this genus is understood in our North American lists, the venation is practically the same, but there are characters which will later cause its removal to probably a new genus.

Forewing. — Two and one half times as long as broad, costal and dorsal margins nearly parallel; costa strongly arched at base and curved downward at apex; apex rounded, obtuse; termen very slightly convex, angle 30°; tornus rounding into dorsum without defined angle. Venation; 1^b furcate two fifths; 2 from outer eighth of cell; 3 and 4 approximate, the latter strongly bent down; 5, 6 and 7 about equally spaced, latter to costa before apex; 8 very close to but not connate with 7; 9 from outer angle of cell; 11 half way between 10 and 12. Cell is very broad at outer end, equal to one third width of wing, transverse vein angles outwardly from 9 to 7 then inwardly (parallelling termen) to 4. No secondary cell.

Hindwing. — Slightly broader than forewing, costa gently arched, apex obtuse, termen slightly indented above 5, tornus, dorsum and inner angle evenly rounded. Venation; 1^b furcate $\frac{1}{3}$, two from outer third, 3 and 4 connate from lower angle of cell, 5 remote from 3 + 4, 6 and 7 connate from upper angle. Cell very short, about two fifths, transverse vein strong, obliquely inward from upper angle to middle of cell, thence outward to lower angle. A pencil of long hairs reposes on the costa, arising from a process, at base of costa, this is overlaid with spatulate scales. Vein 1^a is heavily pectinated, at base of wing, on upper surface.

Choreutis tacubayella, new species.

Expanse 10 mm.

Thorax olive-brown, very finely speckled with white, with a white spot on posterior end; abdomen dark fuscous. Each joint whitish posteriorly, anal tuft blackish; legs, underside of thorax and underside first two abdominal segments white, slightly dusted with fuscous. (Head missing.)

Forewing. — Olivaceous brown, with an ochreous tinge at base, outer half overlaid with whitish tipped scales, giving a speckled appearance. There is a conspicuous pure white fascia, arising from dorsum between inner fifth and third, it reaches to upper vein of cell; it is broadest on dorsum, inclines slightly outward and diminishes in width to upper end; the upper part is faintly dotted with pale fuscous. The principal metallic marks are brilliant ruby red and occur as follows: a broken transverse line just beyond the white fascia; two clusters in outer fourth of wing below middle on a large velvety black ovate spot, which is divided vertically by an olivaceous line; above this below costa is a smaller spot and a similar one before and below it, these are both circled with black; bordering termen is a fine line on upper half of wing; in middle of wing, before end of cell is a small ovate blackish spot, in which are scattered metallic scales. The costa is marked by three white dots, one before the middle, one just beyond middle and one at outer fourth; the inner one is at the end of the inner metallic line, below the middle one are a few such scales, while the outer one is above the outer metallic spot. The veins before apex are overlaid with black, there is a median black dash at base and another in middle of wing. The termen is narrowly edged with olivaceous ochreous. In certain lights a few scattered metallic scales can be seen, especially on base of costa, in middle of wing at base, above

dorsum at outer fourth, and evanescently the edges of the ruby red spots are so colored. Cilia olivaceous brown, finely tipped with white.

Hindwing. — Bronzy brown, cilia whitish. Underside both wings brassy brown, the lower wing blotched with white, and the costal spots repeated on the upper.

One ♂, Tacubaya, Mexico, collected by Otis W. Barrett. Type in my collection.

Argyresthia alternatella, new species.

Expanse 10–12 mm.

Head white; palpi golden; antenna golden fuscous, basal joint paler; thorax white, patagia and posterior end golden; abdomen and legs whitish ochreous.

Forewing. — Golden ochreous, reticulated with brown oblique fasciæ, there are five brown spots on costa, about equally spaced between inner sixth and outer fifth, there are three similar spots on dorsal margin, at inner fourth, middle and outer fourth; broken brown fascia join the costal and dorsal spots, somewhat like a double or joined letter **WV**. There is a streak of brown on dorsum at base, and the apex of wing is lightly reticulated with this color. Cilia light brownish ochreous on costa and upper half of termen becoming pale fuscous below middle.

Hindwing. — Light fuscous, cilia with a faint ochreous tinge.

Eight specimens, Essex Co., Caldwell and Watchung Mts., N. J., May 8–21.

Type in my collection.

Mr. Busck, to whom these specimens were shown, thought they might be *A. cupressella* Wlsm. (described from California) which they superficially resemble, but the two species can easily be separated by the venation. *Cupressella* has 11 veins in forewing and 7 in hindwing, while *alternatella* has 12 and 8 respectively with 7–8 of former stalked; the latter species is quite a little larger.

Argyresthia laricella, new species (Pl. III, Fig. 5).

Expanse 10–12 mm.

Head and palpi whitish ochreous, latter shaded with light fuscous externally on median joint, face and antennæ white; thorax shining whitish ochreous; abdomen paler, legs whitish, anterior pair and tarsi of all dusted with brown.

Forewing. — Neary immaculate, very pale shining ochreous, the inner half of costal edge and narrowly in the fold is more or less of a darker shade. Cilia whitish ochreous.

Hindwing. — Same color as cilia of forewing.

Six specimens bred from larvæ living in the terminal twigs of *Larix americana*, at Mer Bleue, Ontario, Canada. In pupa June 19 (when found), issued July 3–6.

Cotypes, Catalogue No. 12,059 U.S.N.M., Dr. Fletcher's and my collection.

The discovery of this species is due to Dr. Jas. Fletcher, with whom I was on a collecting trip to a wonderful sphagnum swamp, about twenty miles south of the Ottawa River, at Carsbad Station, Ontario. He tells me that he had noticed for some years that insects were killing the twigs of the larch and had occurred in sufficient numbers to be of possible economic importance. The larvæ bore through the terminal twigs, for from three to six inches, effectually killing them and stopping further growth. Mr. Busck is responsible for the generic determination.

Chrysopora versicolorella, new species (Pl. III, Fig. 3).

Expanse 9–10 mm.

Head and antenna bronzy black, latter with whitish pubescence; median joint palpi bronzy black, apical joint ochreous gray; thorax irridescent gray; abdomen grayish fuscous, anal tuft and legs ochreous white, latter banded with dark brown.

Forewing. — The white ground color occurs as follows: on the lower three fifths of wing from base nearly to middle; a large triangular spot on middle of costa which sends an attenuated fascia to dorsum, this is largely irridescent; a pure white spot on costa before apex, a smaller one below it on middle of termen and another below this above tornus; in some specimens these spots are so nearly connected together that they form a very angulated terminal fascia. Above the white inner patch is a blackish patch interrupted with pale blue metallic scales, a broad ovate spot of this color divides it beyond its middle, touching the costa and continuing as an irridescent fascia over the white area to dorsum. Between the middle and terminal whitish spots or fasciæ is an irregular patch of olivaceous ochreous, more or less overlaid with metallic pale blue or pink on the lower and outer spurs. There is an oblique blackish brown streak involving the apex and apical cilia, the inner end of this indents the outer white costal spot and the one below it. Cilia fuscous, paler outwardly, broken by white opposite the tornal white spot.

Hindwing. — Pale shining gray, cilia and underside the same. Underside forewing dark irridescent gray.

Six specimens, Carmel, California, April, collected by Arthur H. Vachell.

Type in my collection.

The three species accredited to North America can be separated as follows:

Dorsal margin on inner half of forewing white.....*versicolorella* K.
Dorsal margin on inner half of forewing not white.....1
1. Forewing with transverse silvery fascia before middle.....*hermannella* F.*
1. Forewing with fascia interrupted in middle.....*lingulacella* Cl.

*I am not convinced that this European species actually occurs in the North American fauna.

As will be noted from Pl. III, Fig. 3, the venation of this species is not identical with that of *C. lingulacella* Clem. as shown on Pl. XXIX, Fig. 9, Proc. U. S. N. M., Vol. XXV, by Busck, veins 3–4 of forewing are distinctly connate in *versicolorella* while in *lingulacella* they are well separated, as shown by Fig. 4.

Gelechia invariabilis, new species.

Expanse 18–22 mm.

Head whitish in front, above suffused with light brown; palpi, second joint white mottled with dark gray, terminal joint black speckled with white; antenna light brownish cream color, basal joint darker; thorax light ochreous brown, shoulders of patagia, shade across middle and posterior end reddish brown — the shade known as terracotta red. Abdomen light ochreous; legs white, shaded with fuscous.

Forewing. — Costal half whitish ochreous, dorsal half reddish terracotta; the division line is dentate and very sharply defined, the red touches costa at base, thence obliquely to fold at inner third, it then bulges out above the fold reaching middle of cell before middle of wing, the upper edge of prominence is rounded from where it curves concavely to middle of wing at end of cell, thence obliquely to tornus. Separated from the dorsal red shade by a narrow line of light ochreous ground color, the red is continued along termen. In apex is a large reddish brown spot, and two others of same size on costa, between veins 8 and 10. The inner two thirds of costa is narrowly edged with black and on the termen is a line of same color broken with white over each vein. The dorsal margin is narrowly edged with black adjoining the red area, and the latter is somewhat dotted and streaked with black; the upper edge of red area is strongly marked with black, except at extreme base. Cilia grayish white, dotted with fuscous.

Hindwing. — Light gray, cilia tinged with cinereous, underside the same. Underside forewing ochreous brown, costal spots repeated, tinged with purplish on dorsal half.

Nine specimens, Stockton, Utah, September 5–9, 1906, collected by Tom Spalding.

Type in my collection.

In venation and structure this species is like *variabilis* Busck, there is also a superficial resemblanee, but regardless of the characteristic red dorsal edging of *invariabilis*, the position of the black median streaks is very different, in the latter they are deeply indentate while in the former they are straight lines.

Gelechia terminimaculella, new species.

Expanse 17–18.5 mm.

Scales of head white, tipped with shining fuscous; second joint of palpi grayish white, lightly speckled with blackish brown, and a shade of the latter color at base beneath, apical joint dark brown, dusted with white in the middle and at the tip; antenna fuscous and white annulations; thorax stone gray; abdomen yellowish gray; legs gray, the anterior tarsi dark brown, annulated with whitish gray at the joints.

Forewing. — Stone gray, marked with black. The base of costa is blackish gray, from the inner fifth a short black dash joins an oblique inverted comma-shaped mark that extends to fold. Between this and base there is a small black dash in the middle of wing and a dot on dorsal margin close to base. In the middle of cell are two black dots, the upper one nearer the base; above them the costa is slightly sprinkled with black scales. At the outer third of costa there is a rounded shade of blackish scales, extending down to middle of wing; on the inner edge of this shade, at end of cell, is an oblique, elongated black spot. The terminal line is a row of dots, beginning with the costal cilia and following the termen to tornus, one dot between each two veins; before these dots the venal interspaces are very slightly dusted with black. Cilia concolorous.

Hindwing. — Very light gray, cilia with a faint yellowish tinge; underside the same, with a clouding of fuscous along costa and in apex. Underside forewing dark fuscous, with the terminal dots faintly repeated.

Six specimens, Aweme, Manitoba, June 13–16, Norman Criddle; Rounthwaite, Manitoba, June 15, L. E. Marmont.

Type in my collection.

The shape of wings and venation is exactly like figure of *Gelechia serotinella* Busck, Proc. U. S. N. M., XXV, 1902, the palpi structure agrees with *G. alternatella*. The markings of the species are close to *fondella* Busck; it can easily be separated by its larger size, the separated dots on disc and by the prominent terminal line of black dots.

Gelechia alternatella, new species.

Expanse 14.5–15.5 mm.

Thorax and head mottled brown and bronzy black, darkest posteriorly, face brown mixed with white scales; labial palpi, second joint, white at base both inner and outer surfaces, lower edge mottled with dark brown, this mottling extends over the outer half both inside and out, apical joint very dark brown, sparsely dotted with white; antenna black, annulated with white; abdomen, anterior edge each segment dark bronzy brown, posterior edges broadly white, and segment brown; legs black, annulated with white at joints; tongue long, basal third scaled with whitish gray in front; ocelli present.

Forewing. — There are four dark brown transverse streaks or fasciæ, on a whitish gray ground color, all of nearly equal width dividing the surface into sharply defined alternate streaks of these colors. The brown is as follows: from the costa at base an oblique fascia goes below fold but does not reach dorsum; the base before and below it is whitish gray; before the middle is a transverse fascia slightly broader on costa and denticulate in middle, on inner edge; there is a broad shade of brown on costa from middle to outer fourth, occupying the upper third of wing, from the middle of this a darker brown fascia curves obliquely to tornus; there is a broad subterminal fascia from apex to tornus; terminal line, beyond this is whitish gray. The subterminal fascia makes a small brown spot in the costal cilia before apex, and in the whitish space before it is another brown cilial spot on costa. Cilia gray at apex, shading into whitish below, with three small clusters of darker scales on upper half of termen. The gray-white ground color is somewhat mottled with brown scales.

Hindwing. — Light brassy fuscous, cilia gray, underside whitish gray; underside forewing bronzy brown somewhat overlaid with white.

Five specimens, Aweme, Manitoba, May 12 to 25, collected by Norman Criddle; ten specimens from A. J. Oslar, Chimney Gulch, Golden, Colo., April 14.

Type in my collection.

The venation, shape of wings and structure of palpi agree with figure of *Gelechia terrella* Hbn. in Meyrick's Hand Book British Lepidoptera, except that vein 5 of hindwing rises about one third from lower angle of cell and veins 6 and 7 are separate. Mr. Busck regards this species as *G. virgella* Thnbg. (*longicornis* Curt.). I have carefully compared a series of this European species and do not agree with his opinion.

Coleophora elæagnisella, new species (Pl. III, Figs. 7 and 8).

Expanse 15 to 21 mm.

Head, thorax and palpi dull white (or white with the least trace of a grayish shade), palpi shaded with gray externally; antennal brushes white in front, gray behind, twice as long as basal joints; antenna white with broad cinereous annulations; abdomen cinereous; legs dull white, anterior pair dusted with gray in front, all faintly darker between joints.

Forewing. — Dull white, slightly shining, dotted sparsely to heavily with dark brown in horizontal rows, except at extreme base; the dark dots are more closely spaced in apical third of wing. Nowhere do they congregate into larger spots or lines. The white color extends out to the end of the cilia at extreme apex, and is heavily dotted with dark brown; below apex cilia is grayish cinereous.

Hindwing. — Shining grayish fuscous, cilia cinereous. Underside both wings the same.

Winter case about 3 mm. long, the ends and under surface are dark brown, on the upper surface is a large grayish patch: the case is scimeter-shaped, dorsal edge well rounded, radius about 100°, ventral edge with an enlargement in the middle, mouth at an angle of about 45° from the ventral line. It is securely attached by the mouth end only to the bark, sometimes in a fork.

Mature case, 10–12 mm. long, 2.25 mm. wide, 1.75 mm. thick; of the same general shape as the winter case but less rounded on the dorsal edge, and the hump on the ventral edge is depressed in the middle. The appearance of the mature case would indicate that it was not entirely new, but that the winter case had been used and enlarged by splitting along the ventral line and broadening it out with gray silk, then adding to the open end as the larva required more room. The old part is blackish brown, middle cinereous gray, outer end dark brown, the additions are added on the same angle as the mouth opening, giving an oblique direction to the ridges.

Fig. 7 shows maculation of forewing, Fig. 8 the large mature case and the small winter case, all three drawn to same scale.

Described from twelve specimens and many cases all taken in the Central Experiment Farms at Ottawa, Ontario, feeding on *Elæagnus argentea* and the closely allied *Hippophoe rhamnoides* and *Shepherdia argentea*. I am indebted to Dr. James Fletcher for the botanical names and to both him and Mr. Arthur Gibson for collecting the winter cases.

Type in my collection.

In the middle of June, 1907, the mature cases were found most abundantly, in fact so much so, that the shrubs of *Elæagnus* and allied plants very perceptibly showed the effect of the operations of the larvæ. The latter were not sufficiently full fed at this date and only one completed its transformations on July, 24. In 1908 Mr. Gibson sent me about twenty mature cases, which produced eleven specimens between July 4 and 25.

Nepticula slingerlandella, new species.

Expanse 3.5 to 5 mm.

Head and frontal tuft orange, antenna eye-caps and side tufts white; antenna whitish gray; thorax bronzy black; abdomen light gray; legs yellowish white, posterior tarsi finely ringed with black.

Forewing. — Bronzy black with a shining white fascia at outer third. Cilia and hind wings light gray.

Type in my collection, numerous topotypes in Cornell University collection; all bred from blotch mines on leaves of plum in domestic orchards near Rochester, N. Y., by Prof. M. V. Slingerland, in whose honor the species is named. In a forthcoming bulletin Professor Slingerland will give a detailed account of the life history.

Incurvaria? dietziella, new species (Pl. III, Fig. 6).

Expanse 6.5 to 10.5 mm.

Antenna finely serrate, thick, about two thirds as long as forewing, purplish black. Labial palpi short, do not extend beyond face, clothed with long yellow hairs mixed with brown. Max. palpi, if present, probably short, folded, concealed by dense hairs on face. Tongue well developed, scaled above. Eyes round, prominent, wide apart. Ocelli present. Head and face covered with long, light ochreous yellow hairs. Abdomen bronzy black. Legs, anterior and middle pair bronzy black, posterior pair grayish brown, whitish at joints and the tibiæ much thickened with appressed scales, from the upper side of which are emitted a dense pencil or cluster of hair-like scales.

Forewing. — Ovate-lanceolate, obtusely pointed at apex; 12 veins, 2 from lower angle of cell, 7 and 8 stalked both to costa; 1^b furcate at base. Cell widened in outer third by absorption of accessory vein. Between 3 and 9 transverse vein is not tubular. Color bronzy black, finely dotted with metallic blue. The ground color by reflected light is golden and purple bronze; the thorax exhibits the same reflections. Cilia grayish below apex, above concolorous.

Hindwing. — Broadly lanceolate, costa arched at base nearly straight to outer fifth, apex obtusely rounded, termen oblique, straight; dorsal margin nearly parallel to costa. Eight veins, 5 and 6 short stalked, 7 from upper angle of cell; 1^b furcate at base; between 3 and 7 transverse vein is not tubular. Color bronzy brown, slightly shining, but without the brilliant gold reflections of the forewing; grayish white above cell; cilia shining grayish brown. Underside both wings shining golden gray.

Described from about fifty specimens all taken in Essex County Park, New Jersey, flying about or resting on the leaves and flowerets of dogwood, *Cornus candidissimus*, May 30 to June 15.

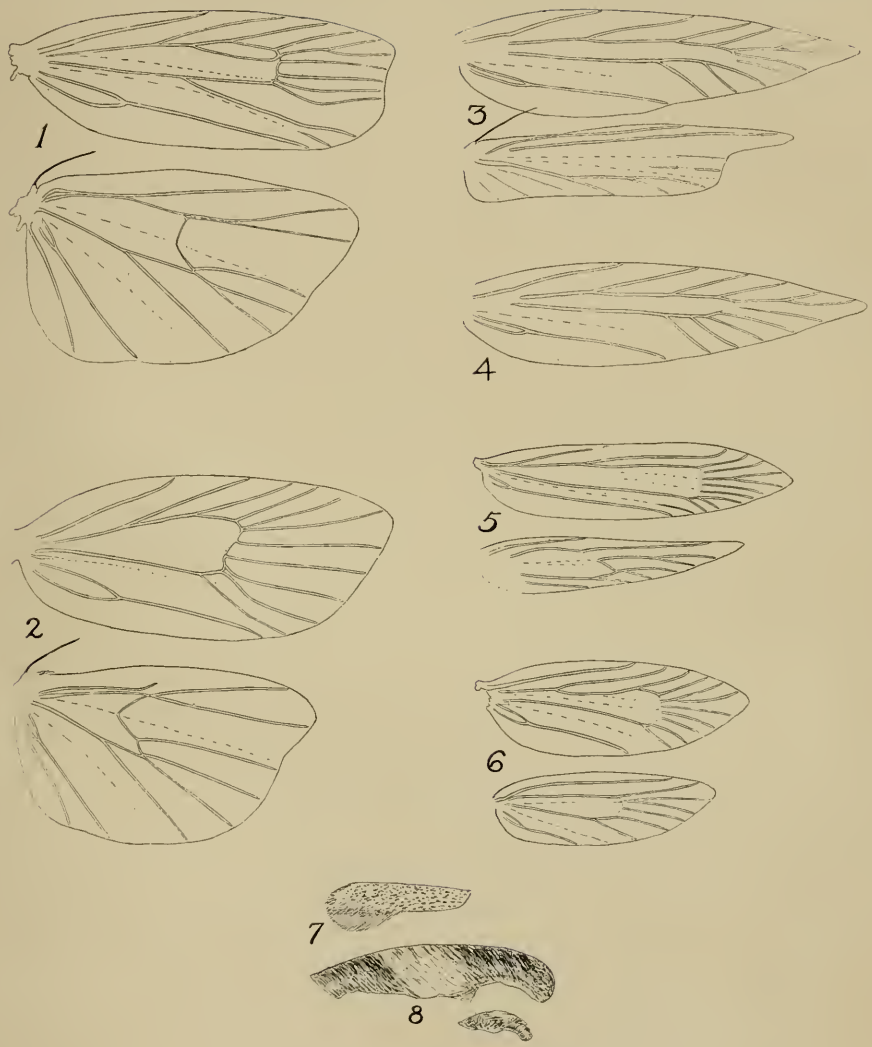
Cotypes, Cat. No. 12,058 U.S.N.M., in Dr. Dietz's and my collections.

Named in honor of Wm. G. Dietz, M.D., of Hazleton, Pa., who has recently revised the very difficult group to which this species belongs. Dr. Dietz writes me that he believes that this species represents a new and valid genus, but I prefer to leave this for future settlement, which will be aided by the diagnosis and figures. The specimens were all collected on two small clumps of *C. candidissimus*, flying in the bright sunshine, morning and afternoon; I visited these clumps nearly every week during the summer and made exhaustive efforts to find some clue to the life history, but without success.

This species is much like *P. acerifoliella* Fitch but besides the structural differences, the forewings of latter are brilliant metallic blue, the hindwings are grayer and the head tuft is a deeper, brighter orange.

EXPLANATION OF PLATE.

FIG. 1. Venation *Steganoptycha bolliana* Sling.
FIG. 2. Venation *Commophila umbrabasana* sp. nov.
FIG. 3. Venation *Chrysopora versicolorella* sp. nov.
FIG. 4. Venation *Chrysopora lingulacella* Clem.
FIG. 5. Venation *Argyresthia laricella* sp. nov.
FIG. 6. Venation *Incurvaria dietziella* sp. nov.
FIG. 7. Venation forewing, *Coleophora elæagnisella* sp. nov.
FIG. 8. Cases of *Coleophora elæagnisella* sp. nov.



Tortricidæ and Tineina.

DESCRIPTIONS OF NEW SPECIES OF NORTH AMERICAN CRAMBID MOTHS.

By William Dunham Kearfott,
Of Montclair, New Jersey.

Among the fifty-odd thousand specimens of North American microlepidoptera which I have acquired during the past ten years, there have been many specimens belonging to the subfamily Crambinæ of the Pyralidæ, which have been placed in storage boxes awaiting an opportunity for authentic determination and arrangement. During the early part of this year I spent several days in Prof. C. H. Fernald's hospitable home, and, with his aid, secured the names of all that were already described; but there remained a large number of species that were apparently new to science.

Only the most interesting of these, and only those that are represented usually by good series, are treated in the present paper. There is an opportunity in this family for an excellent piece of work, with the aid of the microscope and camera-lucida, which would open up a wide field in the wonderful diversity and characters of the antennæ and head parts particularly, as may be noted by figs. 7 to 12 on pages 387 to 391, representing some of the Thaumatopsids. I hope some one with more time to devote to the group will become as enthusiastic as I have after this brief study. The most necessary work of reference, treating of the world's genera and species, is Hampson's Classification in the Proceedings of the Zoological Society of London, 1895, and, of course, for the North American fauna, Fernald's Revision of 1896 will be found useful.

Genus USCODYS Dyar.[a]

Head with small tuft of broad-raised scales between antennal joints, frons slightly roughed.

[a] At the last moment, I am compelled to withdraw a new name proposed for this genus, and substitute *Uscodys*, erected by Dr. Dyar in a paper issued Sept. 15, 1908, a part of the Proceedings of the Entomological Society of Washington, Vol. X, and thus avoid a synonym.

Antenna, male, slightly dentate and microscopically pubescent; female, simple, basal joint large and ridged on inner side, forming a deep socket in which the second joint is movable.

Labial palpi extends $3\frac{1}{2}$ times eye-width beyond head, second joint densely tufted below, tuft reaching to end of apical joint; latter obtusely pointed and except at base not hidden by scales of median joint.

Maxillary palpi, nearly half length of labial, triangularly scaled.

Tongue moderate, closely coiled between labial palpi.

Ocelli absent.

Thorax smooth.

Fore wing over $2\frac{1}{2}$ times as long as wide; costa very slightly ached, curving more to apex; latter rounded, obtuse; termen slightly convex,

FIG. 1.—VENTATION OF USCODYS CESTALIS.

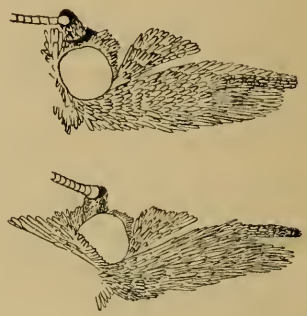


FIG. 2.—TWO VIEWS OF HEAD STRUCTURE OF USCODYS CESTALIS.

about 45°; dorsal margin nearly straight. Vein 1^{abc} present; 1^{b} not furcate at base; 2 from outer fifth of cell; 3, 4, and 5 about equidistant at origin; 6 from below upper angle; 7, 8, and 9 stalked; 10 separate close to 7+8+9; 11 from outer third of cell.

Hind wing, lower median vein with long scales above; frenulum of one spine only in both sexes; slightly wider than fore wing; costa slightly depressed before middle and convex beyond, apex obtusely rounded; termen 45°. Veins 1^{abc} present; 1^{b} not furcate at base; 2 from outer fourth of cell; 3 before end of cell; 4 and 5 close at origin from lower angle[a]; 6 and 7 connate from upper angle; 8 very close to cell its whole length, but not coincident with it as in other Crambinæ.

Legs smoothly scaled.

Habitus rather stout.

Type.—Uscodys cestalis Hulst.

[a] The furcation at outer end of vein 4 of hind wing as shown in fig. 1 has been only found in one side of one specimen; a number of others examined showed no trace of this abortion.

USCODYS CESTALIS (Hulst).

Ancrastia cestalis HULST, Trans. Amer. Ent. Soc., XIII, 1886, p. 164.
Aglossa cestalis FERNALD, Smith's List Lep. Bor. Amer., 1891, No. 4215.
Aglossa cestalis FERNALD, Bull. 52., U. S. Nat. Mus., 1902, No. 4512.
Aglossa costalis KEARFOTT, Smith's List Lep. Bor. Amer., 1903, No. 4883.
Uscodys cestalis, DYAR, Proc. Ent. Soc. Wash., X, 1908, p. 101.

After examination of specimens of this species in 1904 Doctor Dyar advised me that it belonged to neither the Epipaschiinæ nor the Pyralinæ, where it had been placed by Hulst and Fernald, but should be included in the subfamily Crambinæ, suggesting that it was "*n. gen. et sp.*" Shortly afterwards, when visiting the Hulst collection at New Brunswick, he saw Hulst's type, thus securing the specific name.

The species seems to be very abundant in southwestern Arizona. More than one hundred specimens have passed through my hands from both desert and mountain collections. Among the localities are Yuma County, Arizona, desert, March 26 to April 10, J. B. Smith; Yavapai County, Arizona, March 10–31, J. B. Smith; southern Arizona, August 1–15, O. C. Poling; Baboquivaria Mountains, Pima County, Arizona, July 15–30, O. C. Poling.

The species is somewhat variable in the intensity of the markings and of the light and dark shades. The females have dark gray or dark cinereous hind wings, while these wings in the male are whitish gray. The fore wings of the males are also lighter generally than the other sex. The general appearance of the fore wing is a mottled gray, with a conspicuous triangular whiter patch on upper half of wing and touching costa from middle to outer fifth; the males average from 22 to 26 mm. and the females from 25 to 32 mm.

This species seems to have been entirely ignored by both Ragonot and Hampson in the seventh and eighth volumes of Romanoff's Mémoires sur les Lépidoptéres.[a] It does not appear in the specific index of either volume, nor could I find it in the text or footnotes approximating the place it should be if Hulst's generic position had been followed.

PRIONAPTERYX STEPHENS and allied genera.

The species included in the four genera below bear a strong superficial likeness to each other and readily form a small subfamily group in the Crambinæ which are not easily confused with any other species or genera of the large family. Except in one genus (*Suratha*) they are all characterized by an incision in the termen of fore wing at end of vein 5, or in more modified species the termen below 5 is well cut away, leaving a projection on the upper half of wing.

In markings the species are of combinations of cream white, ochreous to dark brown or grayish brown; the inner line is usually

[a] Monographie des Phycitinæ et des Galleriinæ.

strongly dentate and is frequently emphasized by enlarged spots on lower half. The terminal line and costal, apical, and marginal spots are the most constant marks for separation, and with good figures bringing out these characters, it would be very easy to separate the species.

The venation and structural characters seem to be subject to very little variation in each species, but there is a great divergence in the different species, quite sufficient, I think, to divide some of the genera into several others or subgenera. I have not thought it necessary to go into these differences at the present time, as the subject is so ably covered by Sir George Hampson's classification, hence particular attention is only called to the structure of such species as are characterized as new.

No doubt continued collecting in Mexico, Central and South Americas will add many interesting species to the lists, as the groups seem to be most common in the subtropical regions. Little or nothing is known of the life histories, excepting one species, *P. nebulifera* Stephens, which has been well worked out by Mr. E. Daecke.[a]

The larva of this species is solitary, feeding on the leaves of huckleberry (*Vaccinium* sp.) and sand myrtle (*Dendrium buxifolium*). It has the peculiar habit of constructing a tube of sand and silk on the stalk and stems of its food plant, forming a covered, protecting passage from a hole in the ground near the root, into which it retreats when danger threatens, to the fresh leaves upon which it feeds.

This clew should assist collectors in the arid regions of Arizona and New Mexico to the life histories of the several species which are quite common there, especially as these tubes must be rather conspicuous objects.

ANALYTICAL KEY TO GENERA.

1. Fore wing with termen entire ..... *Surattha* Walker.
   Upper half of termen strongly produced 2
2. Vein 6, hind wing, from upper angle of cell [b] ..... *Mesolia* Ragonot.
   Vein 6, from below angle 3
3. Veins 4 and 5, fore wing, separate at origin ..... *Prionapteryx* Stephens.
   Veins 4 and 5, stalked or connate ..... *Engrotea* Fernald.

Genus SURATTHA Walker.

Surattha Walker, Cat. Brit. Mus., XXVII, 1863, p. 75.
Calarina Walker, Cat. Brit. Mus., XXXV, 1866, p. 1770.
Surattha Hampson, Proc. Zool. Soc. Lond., 1895, p. 965.

Hampson's description of this genus is as follows:

Palpi porrect and thickly scaled, extending about one and a half times length of head; maxillary palpi triangularly scaled; frons with a conical process;

[a] Entom. News, XVI, pp. 12–14, pl. II.

[b] In some male specimens of *M. oraculella* vein 6 is from slightly below upper angle.

antennæ of male bipectenated, usually with long branches; tibiæ with the spurs long, the outer spurs about two-thirds length of inner.

Fore wing long and narrow; the apex rounded; vein 3 from near angle of cell; 4, 5 usually on a long stalk; 6, 7, and 10, 11 free. Hind wing with vein 3 from near angle of cell; 5 absent; 6 obsolescent, from above middle of discocellulars; 7 anastomosing with 8.

SURATTHA(?) SANTELLA, new species.

Expanse, 19 mm.

Palpi, head and thorax dark cream, speckled with light brown; the outer ends of palpi, both inside and out, are shaded with darker brown; antennæ dark cream, annulated with light brown; abdomen whitish cream, upper side first segment shaded with reddish brown, and a brownish tinge on the next two segments, anal tuft ochreous brown; legs cream white; tarsi annulated with brown.

Fore wing white, with shades and marks of light and dark ochreous brown. There is a transverse white line in middle of wing, with two sharp angulations on outer edge, in middle of wing; before this line the basal half is white, well mottled with light and dark brown. Beyond the line there is a parallel light brown line of same width; between this and the terminal and apical lines and marks the surface is principally white, dusted with brown in horizontal streaks. About one-sixth before apex the white subterminal line starts from costa and goes straight to termen at end of veins 4 and 5; it then goes obliquely inward to fold, below end of cell, having two spurs below; it then follows fold outward nearly to termen, where it is lost in the mottled ground color. It is paralleled on both sides by brown; on the outside the brown shade extends to the white terminal patches. Just before apex is a broad white dash from costa to termen at end of vein 6, connecting there with a small white dot, on which is a black dot. Between 5 and 2 is a white terminal patch containing three black dots. The cilia is shining white, alternated with light fuscous in middle of wing and darker at apex; before the cilia is a narrow light brown line. Over the upper angle of cell is a prominent rounded brown dot.

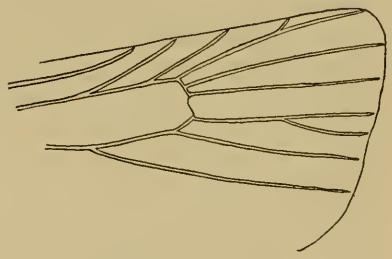


FIG. 3.—VENATION OF FORE WING OF SURATTHA SANTELLA.

Hind wings light, smoky gray, cilia whitish, underside the same. Underside fore wing pale ochreous brown, with white apical and terminal spots faintly repeated.

Described from 2 specimens collected by O. C. Poling in South Arizona.

Types in Author's collection.

This species differs from Hampson's diagnosis of *Surattha* in following items:

Antenna simple, not bipectenated.

Tibial spurs, both pairs nearly same length, outer at least three-fourths as long as inner. Otherwise the venation is identical with Hampson's figure. The conical process on front of head is a curious chitinous extension of the clypeus (?), and is no doubt used by the moth for effecting its escape from its probably earthy, dry, and hard pupal habitation. Fig. 3 shows outer end of fore wing.

SURATTHA INDENTELLA, new species.

Expanse, male, 22.5–23.5 mm.

Head white in front, light ochreous above; labial palpi white internally, externally pale ochreous, shaded with brown at apex; maxillary palpi pale ochreous; antenna bipectinate, with long branches, stalk whitish, branches blackish brown; thorax creamy ochreous, the outer ends of scales slightly darker, especially of patagiæ; abdomen light grayish ochreous, posterior edge of each segment narrowly white above, the three first segments shaded with ochreous above; legs whitish, dusted with pale ochreous.

Fore wing, ground color creamy ochreous; the outer ends of scales are light brown, giving a speckled appearance under lens; there is a dark brown oblique fascia from inner fifth of costa to inner third of dorsum, almost obsolete at costa, but broad and well defined on lower four-fifths; a dentate transverse brown line at middle of wing, with two strong outward spurs; both the basal fascia and the dentate inner line are edged on both sides by paler lines. The subterminal line from outer sixth of costa is only slightly oblique to upper third, then slightly convex to outer fifth of dorsum, it is white, overlaid with shining pinkish scales; inwardly it is defined by a dark brown line; below middle of wing the white extends into marginal space and is marked by three horizontal black dashes; above middle, ground color is brown with a whitish cloud before apex. Terminal edging brown. Between subterminal line and inner dentate line is a small brown discal dot on upper third of wing. Cilia whitish ocherous, shaded with light fuscous, cut by a white dash at middle; above this the basal half of cilia is conspicuously darker than outer.

Hind wing, dark smoky brown, paler toward base, cilia whitish; underside lighter, with a whitish streak from base to termen, through middle of cell and between veins 4+5 and 6. Underside fore wing light ochreous brown.

Two male specimens, from National Museum collection, Amarillo, Texas, August 30, 1902, Cockerell.

Cotypes.—Cat. No. 11948, U.S.N.M., and in Author's collection.

The venation and structure of this species agrees exactly with Hampson's, fig. 47, p. 965, Proc. Zool. Soc. Lond., 1895, except that termen of fore wing is slightly indented at veins 4 and 5.

ANALYTICAL KEY TO SPECIES OF MESOLIA.

1. Fore wing with whitish or yellowish mark on middle of costa. *incertella* Zinck.
   This character absent 2
2. Ground color fore wing principally white ..... *oraculella* Kearfott.
   Ground color principally ochreous gray 3
3. Dentations of inner line of fore wing acutely pointed. *huachucaella* Kearfott.
   Points of these dentations rounded or obtuse ..... *baboquivariella* Kearfott.

MESOLIA ORACULELLA, new species.

Expanse, male, 20–24 mm; female, 27–30 mm.

Head with conical process in front, light brown in front, darker brown around and between bases of antennæ, these shades separated by a cream white transverse line; labial palpi cream white, heavily overlaid externally, in male with grayish-brown, more lightly in female; maxillary palpi cream white, apical joint shaded with light brown; antennæ, male flattened and broadened, female simple, grayish cinereous; thorax, collar and patagia cream white, former shaded with light brown dorsally and latter at base, centrally the thorax is bronzy gray; abdomen dark cream or pale coffee color, posterior edges of first three segments ochreous; legs cream white, tarsi banded with light brown.

Fore wing, a broad median white streak and the costa edged with white, beginning at inner third and broadening outwardly; elsewhere the ground color is light grayish brown. The inner line begins on costa between middle and outer third as an outwardly oblique brown dash on the white ground color; below this are two superimposed horizontal dashes of darker brown, their outer ends connected by an ochreous brown curved line; the lower dash is in the middle of the white median streak; beyond middle of wing on vein 1^b is a dark brown streak with a short upper limb beneath the white median band and a longer lower limb following 1^b to tornus; between this dorsal mark and the spots in middle of wing the inner line is obsolete. The subterminal line is an oblique brown line from outer fifth of costa to upper third of wing, thence to tornus, slightly outwardly concave, it is edged outwardly with a white line of equal width; beyond the color is light brown, cut on upper third by a fine white line which nearly reaches termen below apex; on the lower two-thirds is a large white oblong spot, containing no black dots or dashes. Before the cilia is a fine brown, terminal line. Above the incision the cilia is white, divided by a broad brown line and edged outwardly with brownish gray; in the incision are a few long white scales without any brown markings; below incision cilia is white, shading outwardly into grayish brown. The lines from costa on upper third of wing are all parallel to each other. The white shade between the

inner and subterminal lines in some specimens forms a distinct white fascia, more or less dusted, especially on the veins with brown. There is a variation in the specimens, caused by the intensity of the brown scaling.

Hind wing whitish cinereous, cilia white, with a fine pale brown line beyond base; underside the same. Underside of fore wing pale ochreous.

Six specimens, Baboquivaria Mountains, Pima County, Arizona, July 15–30, O. C. Poling; South Arizona, August 1–15, Poling; Oracle, Arizona, July 12, E. A. Schwartz.

Cotypes.—Cat. No. 11949, U.S.N.M., and in the Author's collection.

This species may prove to be a light form of *baboquivariella* Kearfott, basing the type of the latter upon the dark form from Huachuca Mountains. From this specimen the description was written. Since then I have obtained additional specimens of both sexes, which can undoubtedly be referred to *baboquivariella*. In these dark forms the white median streak is nearly obsolete, the white subterminal area is not distinctly defined, but the veins are slightly outlined with white. I shall therefore eliminate the four badly rubbed specimens received from Professor Snow, as cotypes of *baboquivariella*. I hope additional material in perfect condition will prove the correctness of these views.

MESOLIA BABOQUIVARIELLA (Kearfott).

Prionapteryx baboquivariella KEARFOTT, Can. Ent., XXXIX, 1907, p. 5.

Certain structural details omitted in the description should be recorded.

Male.—Antenna thickened and flattened; projection in termen of fore wing acute but hardly hooked. Venation fore wing: 4 absent; 6 from very near upper angle of cell; 7, 8, and 9 stalked; 10 and 11 from cell, free. Venation hind wing: 3 and 4+5 separate at base; 4 and 5 stalked two-thirds; 6 present from upper angle of cell; 7 and 8 coincident beyond cell, then separately to margins.

Female.—Venation same as male; antenna simple.

The structure places this species in the very closely related genus *Mesolia* Ragonet, and in section I, between divisions A and B, as defined by Hampson.[a]

MESOLIA HUACHUCAELLA, new species.

Expanse, male, 15–16 mm; female, 17–20 mm.

Head grayish brown, white in front; palpi darker than head, ochreous internally; antenna flattened and broadened in male, simple in female, ochreous gray; thorax cream white, more or less shaded with ochreous brown, especially the anterior end; abdomen

[a] Proc. Zool. Soc. Lond., 1895, pp. 962–963.

light ochreous brown, darker above on first three segments; legs white, tarsi banded with dark brown.

Fore wing dark grayish brown; under a lens this dark color is very mottled, as the bases of the scales are lighter, ochreous or whitish, than the tips. On and below the fold is a whitish streak, defined by an oblique dark streak on inner third and the dark brown of inner line at outer third. There is a distinct white spot on outer third of costa, between the inner and subterminal lines. The inner line is dark brown from outer third of costa, with two long and sharp outward angulations at upper and lower thirds; from the latter it sends a long line, dilated at end, to middle of dorsum; it is edged inwardly with white. The brown subterminal line from outer fifth is straight and almost runs into incision; below this it is not distinctly defined, but indicated by brown scales on the veins, giving a wavy appearance, to tornus. The space between these lines is more white than elsewhere on the wing, but is dusted with brown, in some specimens heavily. The subterminal line is edged with white on upper third, beyond which is a broad olivaceous brown line, then a fine white line, followed by a darker brown triangular apical spot. Below incision, on termen, is an oblong white spot. Terminal line, before cilia, very narrow, brown. Cilia above incision white, divided by a blackish line near base and blackish outwardly; below incision grayish white.

Hind wing cinereous gray, cilia white, with a faintly darker line close to base; underside paler. Underside fore wing light gray, with white costal marks faintly repeated.

Eighteen specimens, Globe, Arizona, August 25, Kunzé; Phoenix, Arizona, August, Kunzé; Yuma County, Arizona, through J. B. Smith; Huachuca Mountains, Arizona, Poling; Nogales, Arizona, July 22, Oslar; Santa Catalina Mountains, Arizona, July 24–31, from U. S. National Museum; Albuquerque, New Mexico, July 21, Oslar; Oracle, Arizona, July 9, Schwarz; Mesilla Park, New Mexico, 3,800 feet, Cockerell; Baboquivaria Mountains, Pima County, Arizona, July 15–30, Poling.

Cotypes.—Cat. No. 11950, U.S.N.M., and the Author's collection.

This species is unlike any of our *Mesolia-Prionapteryx* group in the decided grayer hue of the fore wings; all the other species have a superficially ochreous or ochreous-brown tinge, and it can be easily separated by this character; the average size is also smaller.

ANALYTICAL KEY TO SPECIES OF PRIONAPTERYX.

1. Fore wing with white cloud at inner third ..... *nebulifera* Stephens.
   Fore wing without this cloud 2
2. With sinuate transverse white line at base of fore wing ..... *serpentella* Kearfott.
   Without this character 3
3. With white dash on middle of termen ..... *achatina* Zeller.
   Without this white dash ..... *cuncolalis* Hulst.

PRIONAPTERYX SERPENTELLA, new species.

Expanse, 18–21 mm.

Head white, slightly speckled with brown, a brown spot in front; on top and behind it are two smaller ones; labial palpi, basal joint externally and basal and median joints internally white, outer half above, internally shaded with leaden fuscous; externally there is a black patch on basal joint (a small dot of same color behind it under eye); second joint narrowly white at base, then brown above, shading into leaden fuscous; maxillary palpi with a black spot at extreme base, another about middle of first joint, and a brown shade above and below the outer joint, internally white; antenna annulated white and dark brown; thorax white, heavily mottled with brown; abdomen ochreous white; there is a posterior dark brown streak on second segment; underside whitish with subventral brown line on middle segments; legs pale ochreous; tarsi banded with brown.

Fore wing dark chocolate brown, marked with pearly white. From the base below costa a sinuate line goes to inner fifth, curves under across fold, then proceeds obliquely to dorsum at inner third; there it curves upward and inward, ending at fold. At the base is a whitish dorsal patch which joins the inner end of this sinuate line. There is a broken middle transverse line, much angulated; the upper part starts beyond middle of costa, curves obliquely outward, and sends a very fine line outward to subterminal; in the middle of wing is a crescent-shaped mark which forms the middle section; this sends a fine inwardly oblique line to the outer part of the sinuate line. There is a white streak on outer fourth of costa and a dusting of white below it on lower half of wing. The terminal line is shining white; from the costa it is sharply oblique into the angle above the termen incision, thence as sharply oblique inward to under its starting point on costa, thence nearly straight to dorsum, with a slight angle at lower fifth; adjoining it outwardly is a broad triangular white patch in middle of wing and a small white patch at tornus; a triangular white apical streak is narrowly edged outwardly with brown. Above the incision the cilia is white at base, brown outwardly; below it is white at base, shading into gray externally.

Hind wing whitish gray, cilia white; underside the same. Underside fore wing light cinereous gray, with the dark and whitish spots in apex repeated.

Six specimens, Vernon and Sabine parishes, Louisiana, June and July, collected by George Coverdale; Cocoanut Grove, Florida, E. A. Schwarz, from National Museum collections.

Cotypes.—Cat. No. 11951, U.S.N.M., and the Author's collection.

The venation is the same as *P. nebulifera* Stephens, and the colors are alike in both species, but the markings are entirely different.

ANALYTICAL KEY TO SPECIES OF EUGROTEA.

1. Veins of outer third fore wing outlined in white_____*yavapai* Kearfott.
   Veins not outlined in white_____*dentella* Fernald.

EUGROTEA (?) YAVAPAI, new species.

Expanse, 19–22 mm.

Head whitish ochreous, speckled with brown; palpi whitish ochreous, shaded with brown externally and on top at base of apical joint; maxillary palpi shaded externally at outer end with light brown; antenna whitish ochreous, broadly annulated with brown, the latter speckled with whitish; thorax creamy ochreous, with whitish patches in middle and on patagia, somewhat speckled with brown, especially marginally and posteriorly; abdomen pale ochreous, darker on dorsal part of each segment; legs whitish ochreous, tarsi banded with brown.

Fore wing mottled white, ochreous and brown. The white occurs in the base, dorsally, in the fold; a transverse twice angulated line in middle of wing, a broad patch on costa before subterminal line; a small spot on costa at beginning of subterminal, a large spot in apex, and on termen between the veins; between 2 and 5, the spots are confluent; the white subterminal line is angulated outwardly to vein 6, then inwardly to dorsum before tornus. The ochreous shades are on inner half of costa, on upper and lower veins of cell, and in the dark patch before the subterminal line. The dark brown is dusted over the whole wing, except where the ochreous and white replace it; the most conspicuous marks are a prominent round spot over upper angle of cell; two or three horizontal short lines in the white patch on termen between 2 and 5; a costal spot between subterminal line and white apical spot, a similar one below it; a terminal line of brown is succeeded by a thin whitish line at the base of the shining leaden brown cilia.

Hind wing pale ochreous gray, cilia whitish. Underside both wings whitish, the fore wing mottled with pale ochreous.

Described from thirteen specimens; twelve from Yavapai County, Arizona, April, from J. B. Smith; one specimen, Colorado, New Mexico, at light, July 10, Cockerell, from National Museum collections.

Cotypes.—Cat. No. 11952, U.S.N.M., and in Author's collection.

There is some variety in the intensity of the colors. Some specimens have but little of the dark brown scaling, but there does not seem to be any variation in the arrangement of the markings.

I am in doubt where to place this species. As will be seen by fig. 4, the outline of fore wing and venation are very different from *nebulifera* Stephens, the type of genus *Prionapteryx;* it is nearer to *Suratha* Walker, differing in the simple antenna and in 6 and 7 of fore wing from a point, but owing to stalking of 4+5 of fore

wing, I prefer to place it under *Eugrotea* with a query. The principal points of structure are as follows:

Head with conical chitinous process in front; rather loosely scaled.

Antenna simple.

Labial palpi extends 2½ times eye-width beyond head; second joint long tufted below, concealing the terminal joint.

Maxillary palpi nearly half length of labial; triangularly scaled.

Tongue moderate.

Ocelli present.

Thorax smoothly scaled.

Fore wing less than 2½ times long as wide; costa straight, apex obtusely rounded, not produced; termen slightly rounded and lightly indented at end of vein 4, angle about 15° from vertical; dorsum slightly rounded. Venation: Veins 1^a and 1^c obsolete; 1^b not furcate at base; 2 from outer fourth of cell; 3 from near end of cell; 4+5 long stalked; 6+7 short stalked or strongly connate; 7 out of 8 beyond middle; 10 free from before end of cell; 11 coincident with 12 for its outer two thirds.

FIG. 4.—VENATION OF EUGROTEA YAVAPAI.

Hind wing 1⅓ as wide as fore wing; lower median vein hairy above; costa nearly straight, apex rounded, termen straight in middle of wing, rounding at tornus. Venation: 1^{abc} present, 1^b not furcate at base; 2 from outer third of cell; 3 from before lower angle; 4+5 coincident from angle; 6 from middle of cell; 7 and 8 coincident for a short distance beyond cell, former from upper angle.

CRAMBUS COCKLEELLUS, new species.

Expanse, 25–30 mm.

Head white, collar yellow; maxillary palpi white; labial palpi creamy white inside, dark coppery brown outside; antenna coppery gray, faintly annulated with white, shaded with white on basal segments; thorax white on middle, laterally and patagia coppery yellow; abdomen grayish fuscous, first three joints above and anal tuft shaded with ochreous brown; legs, femur, and tibia of front pair whitish, otherwise ochreous brown.

Fore wing coppery yellow; the silvery white stripe is very narrow, of about equal thickness throughout, with a slight spur below at inner third; outer end obtusely pointed and not quite reaching to subterminal line. The ground color above it is a little wider than stripe; costa not edged with white. On dorsal margin from base to subterminal line is a white line of half the width of median stripe, edged above with dark scales. There is a narrow white streak on costa at outer fourth, before the subterminal line; the latter begins at outer fifth, goes slightly obliquely outward to upper third, then obliquely inward to dorsum, it is shining white; beyond it on costa is a small triangular, inwardly oblique white patch, duplicated below apex, leaving a ground color spot in apex. The lower two-thirds of margin is white, inwardly dotted with brown and with a marginal row of five black dots on veins 2 to 6. Radiating from the median stripe, the veins are overlaid with silvery gray; these radiations do not extend beyond end of stripe, leaving a broad ground color band before the subterminal line. Cilia pearly gray, white at base of upper third.

Hind wing light gray, cilia whitish; underside the same. Underside fore wing dark gray, ochreous on costa, a terminal row of black dots.

Three specimens, Bear Lake and Jacksons Creek, near Kaslo, British Columbia, August 10–11, collected by J. W. Cockle, and in whose honor it is named.

Type in Author's collection, paratype in Cockle collection.

Probably closer to *C. dumetellus* Hübner than any other species known from North America.

CRAMBUS TRICHUSALIS Hulst.

Crambus trichusalis HULST, Trans. Amer. Ent. Soc., XIII, 1886, p. 165.
Crambus dumetellus FERNALD, Spl. Bull. Mass. Agri. Coll., 1896, p. 33.

Expanse, 24–27 mm.

Head white, faintly gray in front; labial palpi white internally, shining gray outside; maxillary palpi white, gray at base; antenna ochreous gray, basal joints shaded with white; abdomen white, shining ochreous gray laterally and on patagia, collar behind eyes, ochreous; abdomen white, shaded with ochreous above on first four segments; legs light ochreous.

Fore wing yellowish gray. The median silvery white stripe is narrow, running out to a fine point nearly touching subterminal line; a short spur at inner third sends a short white line into fold; the stripe below for inner third is edged with ochreous. Below the costa is a white line from base to middle; above it the costa is edged with dark gray. The subterminal line is silvery white; the angle

is below upper third; before and behind it on costa are large triangular white streaks; on each side of the mottled gray and brown apical spots are smaller white spots. Below the angle of the subterminal line the margin is white, outwardly marked with a row of four or five black dots. Dorsal edge narrowly white; beyond the middle the extreme edge is gray, below the white line. Beyond end of cell the veins are overlaid with silvery white, but not extending to subterminal line. Cilia pearly gray, white at base.

Hind wing whitish gray, darker along costa and in apex, underside the same. Underside fore wing dark gray, termen white, veins dotted with black.

Four specimens, High Bridge, Alberta (Thos. Baird), Regina, July 24, all received from Mr. T. N. Willing; Redvers, Saskatchewan, A. J. Croker.

Homotype in Author's collection.

I had the foregoing description written, under a new name, when a visit to the Hulst collection at New Brunswick showed that my supposed new species was *trichusalis*. Hulst's type is in excellent condition, and I hardly see how it could have been made a synonym of *dumetellus* Hübner. The median silver line of the latter ends at outer third; beyond it and *below* it is an elongated silver spot; in *trichusalis* the silver streak extends in a continuous line, nearly touching the subterminal line, at the outer sixth or seventh of the wing. I have no European specimens of *dumetellus*, but the figures in both British Pyralides by Leech, 1886, and Lepidoptera of the British Islands by Barrett, 1905, show this character. It is also shown in Fernald's fig. 2, Pl. III, Crambidæ of North America. I feel entirely safe in restoring Hulst's name to specific rank.[a]

CRAMBUS YOUNGELLUS, new species.

Expanse, 17–18.5 mm.

Palpi, head, and thorax white, labial palpi on exterior surface, maxillary palpi at base, and patagia shaded with ochreous brown; antennæ grayish white, abdomen white, with a slight yellowish tinge, anal tuft darker; legs white, dusted and banded with brown.

Fore wing bright ochreous brown, a darker shade along costal edge. The usual silvery white stripe is very broad to middle of wing. To this point its lower edge is bounded by the fold, and from which it angles from both upper and lower edges to a point ending midway between veins 5 and 6 and one-third the distance from end of cell to termen. On the inner half of wing the costa is dark gray brown, in

[a] Since the above was written I have received a long series of European specimens of *dumetellus*, and they fully confirm this opinion; in fact, I have seen no specimens from North America which could possibly be referred to this species, and believe it should be stricken from our lists.

a narrow line, about one-fourth the width of the silver stripe. At the lower angle of stripe there is a very slight tooth. Beyond the stripe in middle of wing is a short silvery white streak, outwardly touching the angle of the subterminal line and inwardly slightly underlapping the end of the silvery stripe. On costa before subterminal line is a long, narrow, triangular, outwardly oblique white mark, and beyond the line a much smaller white costal dash. The subterminal line starts from outer fifth on costa, angles obliquely outward to upper third, then parallels termen to dorsum; it is shining grayish white, outlined inwardly by a clear brown line; above the angle is a light ochreous brown triangular spot in apical space; below the angle the subterminal is bounded outwardly by a line or shade of mottled white and grayish brown. The terminal line is black, above the angle solid, below the angle divided into four or five black dots, the latter are ground color in the interspaces; in the upper third this black line is bordered on both sides by a vertical white line, on the outer side overrunning the cilia. On the outer third of wing the veins are overlaid with shining gray, more or less outlined with scattered black scales. The dorsal edge is narrowly silvery white from base to tornus; the outer half is edged above with scattered black scales. Cilia irridescent pearly white.

Hind wing light gray, cilia paler; underside the same shade below middle, above and under side fore wing darker gray.

Described from ten specimens, Mer Bleue, Ontario, July 2–10, collected by C. H. Young, whose name it is a great pleasure to honor.

"Mer Bleue" is a huge sphagnum swamp about 20 miles south of Ottawa. This species is nearer to *bidens* Zeller than any other North American form known to me; it is slightly smaller, but of the same dainty appearance; it can be readily separated by the white streak between stripe and termen. In this respect it is nearer *pascuellus* Linnæus.

Cotypes.—Cat. No. 12060, U.S.N.M., Mr. Young's and the Author's collections.

CRAMBUS BIDENS Zeller.

Mr. Young was successful in collecting a large series of this rare species near Ottawa about the middle of July, including many females, which possess a peculiarity that I have not seen recorded. In this sex the broad white stripe is suffused on the upper half with brown; this suffusion does not extend to the upper edge, which is narrowly silvery. I have also captured this species in a piece of bogland in the pine barren district of New Jersey, near Lacy, about the middle of the State, about 10 miles from the ocean. Curiously the same species of orchid were growing in this spot as I observed a year before in the sphagnum swamp at Mer Bleue. None of the Lacy specimens showed this suffusion.

Aweme, Manitoba, is another locality for this species, collected by Mr. Criddle August 9.

CRAMBUS POLINGI, new species.

Expanse, 16–19 mm.

Head and palpi white, labial externally and maxillary palpi at base shaded with grayish brown; antenna cinereous; thorax shining white with a yellowish gray hue; abdomen whitish brown; legs white, lightly shaded with brown.

Fore wing white, thickly speckled with light purplish brown; above the cell the dark scales have a cinereous tinge and are closer together, forming a stripe on the inner two-thirds; between this and fold the dark scales are almost absent. Median line is indicated by an outwardly oblique dash from costa at outer third, a horizontal dash before it on fold, and below this a small dot on dorsal margin. The subterminal line from outer sixth of costa is white, bounded on each side by purplish brown lines; the outer one merges into a spot on costa before apex; this line curves outwardly to vein 7, then parallels termen; between each two veins it is inwardly rounded. Between it and the dark purple terminal line is a broader whitish line. Cilia shining yellowish cinereous.

Hind wing pale ochreous, underside whiter; underside fore wing same shade, but darker.

Described from fifteen specimens, South Arizona, August 1–15, collected by O. C. Poling.

In shape, size, and general appearance this species is very close to *elegans* Clemens, but the markings are very distinct; the easiest one by which to separate them is the subterminal line, which in this species is beautifully and evenly corrugated its entire length, these corrugations affecting the paralleling lines in the termen; the marginal row of black dots of *elegans* is entirely absent in this species.

Cotype.—Cat. No. 11953, U.S.N.M., and in Author's collection.

CRAMBUS INTERMEDIUS, new species.

Expanse, 16–20 mm.

Head and thorax whitish ochreous, patagia darker; labial palpi short and pendant, whitish ochreous internally, shaded with gray externally; maxillary palpi same as head; antenna light ochreous; abdomen light cinereous, ochreous above on first three segments; legs whitish, powdered with ochreous.

Fore wing dark ochreous above the median white streak, light ochreous below it and on outer third. The median white streak is narrow and extends from base, through lower half of cell to beyond end of cell, where it is lost in the whitish ochreous shade of outer third; its lower edge follows the lower vein of cell; it gradually

widens, upwardly, from base to inner third, then diminishes to middle; beyond it is a fine line. There is a dark brown, broken, terminal line; before it on the costa is a short parallel white dash. The subterminal line is nearly obsolete, on some specimens; there is a shining whitish line from dorsum, at outer sixth, to middle of wing, paralleling the termen. The light ochreous shade of the outer third gradually becomes whitish at termen and the cilia is the same shade, whitish ochreous.

Hind wing, male, white; female, whitish gray; underside white. Underside fore wing ochreous white.

Four specimens, labeled "Arizona." One from Professor Fernald's collection is labeled "*Crambus intermedius* Ragonot—86, yellow label 122." This MSS. name of Ragonot's I am glad to give to the species. In size and median stripe it is close to *hemiochrellus* Zeller and *haytiellus* Zinck. I have four other specimens from Burnet County, Texas, March and April (F. G. Schaupp), which are slightly smaller and much darker, and in which the subterminal line is complete to costa, the area beyond it being heavily sprinkled with white on an ochreous brown ground color, which I believe are darker varieties of this same species, and have so labeled them in my collection.

Cotype.—Cat. No. 11955, U.S.N.M., and in Author's collection.

CRAMBUS DORSIPUNCTELLUS, new species.

Expanse, 24–28 mm.

Head and thorax and palpi light ochreous, latter darker externally; antenna fuscous in front, dusted with light ochreous elsewhere; abdomen grayish ochreous; legs light ochreous.

Fore wing above the fold, light fawn ochreous; below fold, light fawn; the dorsal margin below fold is sparsely dusted with brown; a very few of these dark dots occur in middle of wing in outer half of cell and below lower angle of cell. There is barely a trace of a subterminal line in one specimen; a very faint deeper ochreous line crosses the outer end of fold on the lower third of wing. On the termen, at end of veins 2 to 5, is a small brown dot; above them is a nearly obsolete darker terminal line. Termen is edged with a shining grayish yellow line, the cilia beyond of the same shade, but less shining.

Hind wing smoky gray; cilia, except at apex, whitish gray; under side lighter. Under side fore wing dark ochreous gray.

Described from four specimens, Rounthwaite, Manitoba, July, L. E. Marmont; Verdi, Nevada, June 20–30, A. H. Vachell.

Types in Author's collection.

This species is close to *ruricolellus* Zeller and *vulgivagellus* Clemens. It can be separated from either by the practical absence of all markings and by the much lighter shining line at base of cilia of fore

wing; it is probably closer to *laciniellus* Grote, but lacks the white terminal line of that species and also has much darker hind wings.

CRAMBUS NEVADELLUS, new species.

Expanse, 17–26 mm.

Head pale ochreous; labial and maxillary palpi dark ochreous, paler internally; antenna ochreous brown; thorax pale ochreous, darker laterally; abdomen pale ochreous, first three segments shaded above with darker ochreous; legs whitish ochreous, shaded with light brown.

Fore wing light ochreous brown, darkest on upper half, gradually shading into whitish ochreous on outer third; below the fold the wing is streaked and mottled with white, especially on outer two-thirds, except over vein 1^b, which is brown; on the fold is a dotted line of white; between the fold and 1^b the whitish shade is dotted with a darker brown in a line paralleling the fold; over vein 2, half way between end of cell and termen, is an irregular dark brown line, preceded by a white patch; vein 3 is similarly marked. In the majority of specimens before me these white and dark brown scales on lower half are absent, partly obsolete, doubtless from their transient character. The brown subterminal line is curved outwardly from costa to below middle, then obliquely inward to dorsal margin; it also is more or less obsolete in some specimens. There is a more or less distinct dotted dark line preceding the cilia. The latter is whitish at base and pale ochreous outwardly.

Hind wings above and below light gray, cilia paler. Underside fore wings dark grayish ochreous.

The majority of the specimens are rubbed and present a different appearance from the above description. Color, both above and below middle, pale ochreous, a dark brown median streak from base to end of cell, broken at middle of wing by ground color. Other marks, except the subterminal line, are almost obsolete.

Thirty specimens, Verdi, Nevada, June 10–30, Sierra Nevada Mountains, on border line between California and Nevada, collected by A. H. Vachell.

Nearest to *trisectus* Walker and *albolineellus* Fernald, differing from both by the narrowness of the fore wing.

Cotype.—Cat. No. 11954, U.S.N.M., and in Author's collection.

CRAMBUS SIMPLICIELLUS, new species.

Expanse, 23–31 mm.

Head, thorax, and fore wing, light ochreous gray; both pairs of palpi are white internally, speckled ochreous gray outside; antenna ochreous brown in front, frosted with white elsewhere; abdomen

shining ochreous fuscous, browner on upper side of first three segments; legs white, anterior pair heavily dusted with brown in front.

The fore wing is almost unicolorous, a light ochreous gray or mouse color, with an ochreous tinge. It is somewhat darker on upper third and inner half; the entire inner two-thirds are more ochreous than the outer third, which is an ashy gray, but these shades merge into each other so gradually, and are really so nearly alike, that the wing presents almost a single tone. The inner and subterminal lines are slightly paler, but very faint, the subterminal, from outer sixth of costa, is convex to below middle, then an outward convexity on lower third of wing. There is a faint, darker, broken line before the cilia, which are only slightly shining of a pale leaden hue.

Hind wing dark smoky gray, cilia shining; underside paler. Underside fore wing smoky gray, cilia whitish at base.

Type.—In Author's collection. From Denver, Colorado, May 2, 1904, E. J. Oslar; eight paratypes, Essex County, New Jersey, June 11; Georgia (from Strecker collection), Washington County, Arkansas, July–August, A. J. Brown. The specimens labeled "paratype" are included with some hesitation, and may prove to be a different species.

This is closest to var. *ulæ* Cockerell, differing from it in the absence of the strong reddish and purple shades.

Genus EUFERNALDIA Hulst.

Eufernaldia argenteonervella Hulst, Jour. N. Y. Ent. Soc., VIII, 1900, p. 224.

The type and only species was described from one female. I have recently received a series of both sexes from E. J. Oslar, collected in the Huachuca Mountains, Arizona, August 15–29; also Prescott, Arizona, Dr. R. E. Kunzé, July 7, and Stockton, Utah, September 10, Tom Spalding. From the last locality the fore wings are a deep ocherous brown and the hind wings dark smoky brown. The Arizona specimens agree with Hulst's description, fore wings light ocherous, hind wings silvery white; the outlining of the veins in silver is the same in both forms and makes this species easily recognized. As the venation and head parts have not before been figured, I include them with a few corrections or additions to the original description.

Fig. 5.—Venation of Eufernaldia argenteonervella.

In one of my specimens the maxillary palpi is sharply triangular in outline, less so in the others, but due, I think, to loss of scales. Antenna of male finely pubescent on front side. Venation: Fore wing, 3 is absent (coincident with 4) in all my specimens; 7, 8, and 9 are variable; in some 8 and 9 are coincident, and both 7 and 8+9 are to termen; in others 9 is present as a spur from 8 half way between the stalk and apex, and both 8 and 9 go to costa, 7 to termen; this does not seem to be a sexual variation. Hind wing, 3 and 4 are not from a point, but well separated at their bases; 7 and 8 are coincident from shortly beyond upper angle half way to end of 8.

FIG. 6.—HEAD OF EUFERNALDIA ARGENTEONERVELLA.

Type.—Eufernaldia argenteonervella Hulst.

Superficially, this species reminds me of certain species of the Phycitinæ.

ANALYTICAL KEY TO SPECIES OF THAUMATOPSIS.

1.	Male antenna crenulate	*crenulatella* Kearfott.
	Male antenna not crenulate	2
2.	Male antenna unipectinate	3
	Male antenna bipectinate	8
3.	Fore wing whitish gray	*repanda* Grote.
	Fore wing ochreous or brown	4
4.	Fore wing chocolate brown	5
	Fore wing light ochreous or whitish brown	6
5.	White median streak to termen	*pectinifer* Zeller.
	White median line ending at about outer third	*striatella* Fernald.
6.	Subterminal and inner lines nearly obsolete	*atomosella* Kearfott.
	These lines well developed	7
7.	Fore wing bright ochreous	*fernaldella* Kearfott.
	Fore wing whitish brown	*nortella* Kearfott.
8.	Veins fore wing overlaid with white	*magnifica* Fernald.
	Veins not overlaid with white	9
9.	Median streak white	*edonis* Grote.
	Median streak not white	10
10.	Cross lines obsolete	*gibsonella* Kearfott.
	Cross lines distinct	11
11.	Fore wing whitish brown	*coloradella* Kearfott.
	Fore wing pale ochreous	*pexella* Zeller.

THAUMATOPSIS COLORADELLA, new species.

Expanse, 26–32 mm.

Male antenna bipectinate, branches ciliated; stalk white, narrowly annulated with brown; branches black, cilia whitish. Labial palpi six times longer than width of eye, rather loosely scaled, fuscous gray, tips of scales creamy white; maxillary palpi loosely scaled,

cream white, lightly speckled with fuscous on the outside. Head and thorax light ochreous brown, heavily speckled with fuscous, internal edges of patagia and posterior ends of same whitish. Abdomen light ochreous brown, banded above with fuscous and brown on anterior segments and blackish on posterior segments. Legs cream white, heavily dusted with light fuscous.

Fore wing creamy ochreous, strongly marked with distinct dark brown lines. There is a narrow whitish line through middle of cell from base to end of cell; its outer half is bounded above by a thicker dark brown line; below is a similar but less distinct line from beyond base nearly to end of cell. From apex a strong well-defined line goes to dorsum at outer fourth; it is 45° oblique from apex to upper fourth, then is slightly convex outwardly to lower fourth, where there is a shallow outward pointing tooth. In the middle of lower half is an obscure oblique brown line which points toward end of cell. There is a faint brown streak from end of cell to terminal line below apex, which is a continuation of the brown line above the white median line. The lower half of wing and outer half are more or less dusted with light brown and there is a rather heavily brown scaling at base of dorsal margin. Cilia whitish, speckled with light brown.

Hind wing light grayish fuscous, cilia paler underside the same. Underside fore wing a shade darker than hind wing.

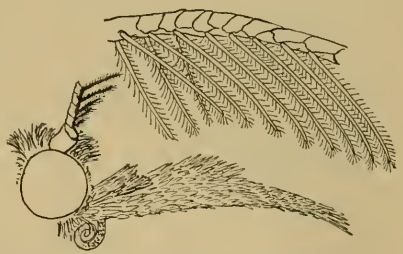


FIG 7.—HEAD AND ENLARGED ANTENNA OF THAUMATOPSIS COLORADELLA.

Eight specimens, Pueblo, Colorado, September 24, H. N. Nash; Durango and Denver, Colorado, May, E. J. Oslar; San Luis Obispo, California, February and March, Arthur H. Vachell.

Cotype.—Cat. No. 11957, U.S.N.M., and in Author's collection.

THAUMATOPSIS GIBSONELLA, new species.

Expanse, male, 26–28 mm; female, 27–31 mm.

Male antenna bipectinated, with branches six to seven times width of stalk, each branch shortly ciliated on each side. Female antenna simple. Labial palpi with rather closely appressed scales on sides, with longer, looser scales on top; porrect, about four times width of eye; maxillary palpi rather loosely scaled, about as long as width of eye. Tongue long, upper end thickly scaled. Face and head light ochreous brown, labial palpi heavily dusted with dark brown, outer joint with grayish brown; maxillary palpi pale light ochreous

at base, tips of scales shaded with gray brown. Antenna, stalk cream fawn, annulated with light brown, branches black, cilia whitish gray. Thorax light fawn, speckled with brown, shading into a whitish posterior patch. Abdomen pale fawn, ringed above with brown on four anterior segments and with dark gray on three posterior segments. Legs pale fawn, finely dusted with brown.

Male fore wing, pale fawn, heavily dusted with brown; the ground color below costa on inner third of wing and over upper and lower median veins is of an ochreous shade. Terminal line nearly obsolete, only showing faintly in one specimen; it is outwardly concave opposite end of cell and sharply dentate above dorsal margin. One specimen has a thin, straight white line through middle of cell; this specimen is of a general darker grayish brown shade, and quite heavily overlaid with white scales on the dorsal margin and outer half of wing. The subterminal line is only faintly indicated by a few darker scales on dorsal half. There is a black dot at end of each vein in termen. Cilia brownish gray, divided by a pale line.

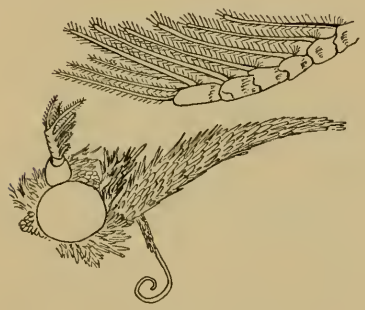


FIG. 8.—HEAD AND ENLARGED ANTENNA OF THAUMATOPSIS GIBSONELLA

Hind wing pale fuscous gray, slightly darker before termen and apex. Cilia whitish, preceded by a darker line; underside the same. Underside fore wing brownish gray.

Described from fourteen males and two females collected at Rostrevor, Ontario, Canada, September 2–16, by Mr. Arthur Gibson, in whose honor the species is named.

The females are of a much lighter color than the males, caused by the absence of the heavy fuscous brown sprinkling. The fore wings are also more elongate and rounded at the apex and anal angle than the male; the female hind wing is whiter.

Cotype.—Cat. No. 11958, U.S.N.M., Mr. Gibson's and the Author's collections.

THAUMATOPIS ATOMOSELLA, new species.

Expanse, 27–30 mm.

Male antenna, unipectinate, branches four to five times width of stalk, shortly ciliated on each side of branches. Labial palpi slender, scales closely appressed, about six times as long as width of eye; terminal joint drooping. Head light ochreous cream color, thorax a whiter shade; stalk of antenna white, branches dark fuscous brown, cilia whitish; labial palpi cream ochreous, thickly speckled with dark fuscous and lightly sprinkled with white; maxillary palpi cream

color, with the long scales tipped with fuscous. Abdomen cream ochreous, slightly darker on top of each segment. Legs paler.

Fore wing pale creamy ochreous, or creamy white terra-cotta; there is a dull white, narrow band from base, over lower vein of cell nearly to termen; before middle of wing it begins to increase in width, so that at outer end it covers all space between veins 2 and 7; the lower part and outer end are overlaid with whitish fuscous; all of the dorsal margin to above the fold is of the same shade. These two whitish streaks are separated by a clear line of ground color; the median white streak is outlined on both sides by blackish brown dots and a line of the same limit the upper edge of the dorsal white shade. Both of the white shades are interrupted by the subterminal line, which is ground color; it cuts through the median at the end of cell and the dorsal before the middle of wing. There is a broad band of ground color before termen, divided by a parallel terminal line of shining whitish scales thickly dotted with brownish fuscous. At the end of each vein, in the middle of termen, is a tiny black dot. Cilia narrowly white at base, followed by a narrow fuscous line, then by a shining whitish line; beyond it is white, thickly sprinkled with light brownish fuscous; extreme tips of scales white.

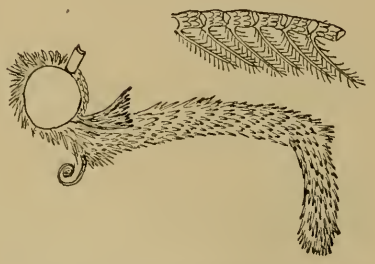


FIG. 9.—HEAD AND ENLARGED ANTENNA OF THAUMATOPSIS ATOMOSELLA.

Hind wing light fuscous, with a trace of a darker line before the cilia; cilia white, divided by a darker line near base; underside the same. Underside fore wing darker fuscous, finely atomized with paler specks; the lines of the cilia are repeated from above.

Two specimens, Phoenix, Arizona, April and May, collected by Dr. R. E. Kunzé.

Type.—In Author's collection.

THAUMATOPSIS CRENULATELLA, new species.

Expanse, 30 mm.

Male antenna crenulate, the teeth being 1½ times thickness of stalk; the teeth are thickly ciliated on their upper sides and outer ends, the internal cilia arising from raised processes or warts. Labial palpi rather smoothly clothed, length about four times the width of eye; maxillary palpi loosely scaled, about as long as width of eye. Head, thorax, and palpi white, heavily dusted with brownish fuscous. Antenna, stalk and cilia whitish fuscous, teeth black. Abdomen whitish

fuscous, banded above with blackish on posterior segments. Legs creamy ochreous, anterior pair heavily dusted with fuscous.

Fore wing white, overlaid with fuscous and blackish brown. The white occurs as follows: A broad median streak from base to end of cell, a fine line on fold, and a dusting on dorsal margin below fold; all veins on outer half of wing overlaid in white; between veins 5 and 8 the white predominates; at the termen the white forms a continuous band. The fuscous occurs along costa, between median white band and fold, below fold and between veins in outer half of wing. The blackish brown occurs only as fine lines, outlining vein 1^b, all veins between end of cell and termen, and is rather heavier between end of cell and apex than elsewhere. The terminal line is ocherous fuscous; it is close to termen, and is sharply angled below costa and dentate at lower end. The subterminal line is of the same color, but somewhat obscure; it follows end of cell, then sharply angles outward halfway to termen in a tooth-shaped process, the lower half of which runs backward to inner third of dorsal margin; it is lightly outlined with white on both sides. The terminal line is outwardly edged with a row of dark brown dots. The cilia is shining leaden, cut by white on the upper half. Preceding the cilia is a line of black dots and lines; between the veins there are four short lines on upper half of wing, three dots below them, and a nearly continuous line of tornus.

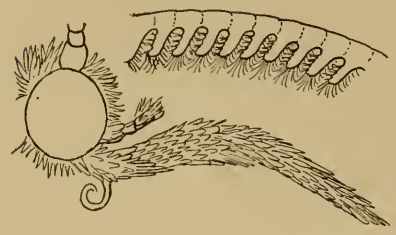


FIG. 10.—HEAD AND ENLARGED ANTENNA OF THAUMATOPSIS CRENULATELLA.

Hind wing light fuscous, with a fine darker marginal line, which at apex is preceded by a few whitish scales; cilia white, divided by a pale fuscous line at base. Underside both wings grayish fuscous; both are margined outwardly with white, with the marginal and ante-ciliate lines and dots repeated.

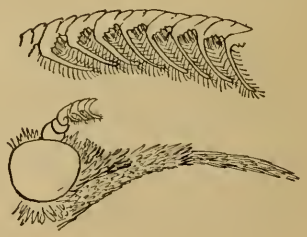


FIG. 11.—HEAD AND ENLARGED ANTENNA OF THAUMATOPSIS REPANDA.

One male specimen, from Baboquivaria Mountains, Pima County, Arizona, latter part of July, 1903, collected by Mr. O. C. Poling.

Type.—In Author's collection.

This species is remarkably like *T. repanda* Grote, and the only way to distinguish them is by the difference in the male antennæ, an enlargement of both, with head structure, is shown by figs. 10 and 11.

I have another specimen of *repanda* from Pima County, Arizona, received from Dr. John B. Smith, which is marked and colored exactly like my type, except that the dark shadings are a little more intense. These two are so exactly alike in every detail, except the form of their antennæ, that I am rather inclined to doubt the stability of the latter. Extensive series may show sufficient intermediate variation to sink the new name as a synonym of *repanda*.

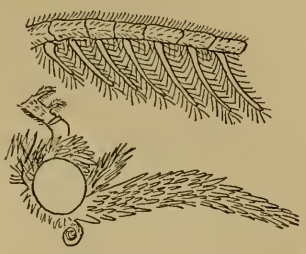


FIG. 12.—HEAD AND ENLARGED ANTENNA OF THAUMATOPSIS PEXELLA.

THAUMATOPSIS PEXELLA Zeller.

A drawing of the head structure, with an enlargement of the antenna is given in fig. 10 for comparison with similar parts of other species in this genus.

ANALYTICAL KEY TO SPECIES OF DIATRÆA.

1. Fore wing with a silver median stripe ..... *parallela* Kearfott.
   Fore wing without silver median stripe 2
2. Fore wing bluish gray, without marks or dots ..... *idalis* Fernald.
   Fore wing yellow or brown 3
3. Fore wing with dorsal white shading ..... *allcni* Fernald.
   Fore wing without this distinct shade 4
4. Fore wing with duplicated subterminal line ..... *saccharalis* Fabricius.
   Without these lines, expanse over 40 mm ..... *differentialis* Fernald.

DIATRÆA PARALLELA, new species.

Expanse, 22–30 mm.

Head white, slightly shaded with cream between antennæ; labial palpi white internally, beyond middle dotted with gray, externally heavily dotted with gray and brown; maxillary palpi white, with external patches of gray scales at base of second joint and at outer end of tuft; thorax white, with short indistinct subdorsal ochreous streaks; patagia light fawn, becoming whitish at posterior ends and dorsally edged with white; abdomen and legs cream white, latter slightly shaded with light ochreous.

Fore wing pale fawn or light ochreous terra-cotta. This ground color is uniform throughout the wing and makes a very effective background for the silver stripes. The median stripe is from base to termen, of uniform thickness except on inner fourth, where it gradually diminishes in width to base; above it is a ground color stripe of equal width; above this the costa is narrowly white from base to apex; veins 2, 3, 4, and 7 are overlaid with white at termen. The dorsal margin is narrowly white and vein 1^b is overlaid with white its

entire length. The median stripe is outlined with scattered black dots. These dots are entirely absent from the costal stripe, but on all other white lines the black dots are sprinkled sparsely over the white; on veins 2, 3, and 4 the black dots follow the veins to cell. There is no trace of a subterminal line, and all of the white stripes extend directly to the terminal line, which is cream white, edged on either side with a fine brown line; beyond this the cilia is white at base and outwardly speckled with gray and brown.

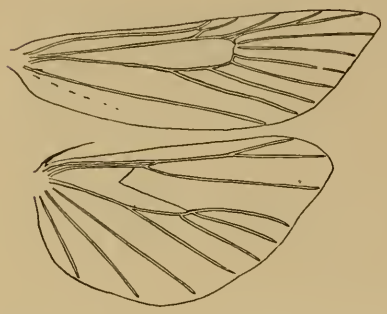


FIG. 13.—VENATION OF DIATRÆA PARALLELA.

Hind wing above cream white, lightly speckled outwardly with pale brown; underside white. Underside fore wing pale ochreous lightly dusted with pale brown.

Described from twenty-three specimens from Almagordo, New Mexico, April 19 to May 5, collected by H. L. Vierick and J. A. G. Rhen.

Cotypes.—Cat. No. 11959, U.S.N.M., in collection of Philadelphia Entomological Society, and in Author's collection.

The venation of this species, as shown by fig. 5, agrees better with Fernald's figure of *D. saccharalis* Fabricius[a] than with Hampson's figure of *saccharalis*.[b] The majority of Hampson's palpal figures in this revision are misleading, as they show the terminal joint as though it were differently scaled than the median joint. This is scarcely ever the case in the Crambinæ. The long overlapping scales of the median joint entirely hide the junction with the apical and usually the same scaling extends to the apex. These characters in this species are shown by fig. 14.

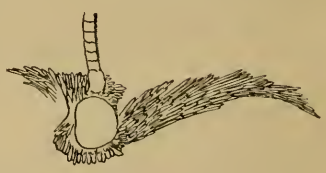


FIG. 14.—HEAD AND PALPI OF DIATRÆA PARALLELA.

ANALYTICAL KEY TO SPECIES OF CHILO.[c]

1. Fore wing with metallic cilia 2
   Fore wing without metallic cilia 3
2. Fore wing with inner and subterminal lines well defined. *placidellus* Haimbach.
   With these lines not distinct ..... *plejadellus* Zinck.
3. Fore wing with veins outlined in brown ..... *denseellus* Zeller.
   Fore wing with veins not outlined in brown 4

[a] The Crambidæ of North America, Plate C, figs. 10, 11, 12.

[b] Proc. Zool. Soc. London, 1895; p. 953.

[c] *Crambus inornatellus* Walker, included in *Chilo* in Smith's list, 1903, No. 4983, is retained by Hampson in *Crambus*.

4. Fore wing ground color white 5
   Fore wing ground color brown 7
5. Fore wing with complete inner and subterminal lines ... *squamulellus* Zeller.[a]
   No lines on fore wing 6
6. Fore wing almost immaculate, over 30 mm. expanse ..... *puritellus* Kearfott.
   Fore wing speckled with brown, under 25 mm. expanse.
   multipunctellus Kearfott.
7. Hind wing dark fuscous ..... *comptulatalis* Hulst.
   Hind wing principally white ..... *forbesellus* Fernald.

CHILO MULTIPUNCTELLUS, new species.

Expanse, 20–24 mm.

Head, palpi, thorax, and fore wing white, with a very faint yellowish tinge, palpi externally dusted with brown; abdomen more strongly shaded with yellowish gray above.

The fore wing is finely speckled with brown all over, roughly arranged in horizontal lines on and between the veins, not visible except through a lens. Before the white cilia is a fine brown line.

Hind wing above and below white. Underside fore wing cinereous white.

Eleven specimens, Oracle, Arizona, June 10, E. J. Oslar; southern Arizona, Poling; Huachuca Mountains, Arizona, Poling; Chiricahua Mountains, Arizona, July 4, H. G. Hubbard.

The venation agrees with Fernald's figure of this genus in his revision of the Crambidæ.

Cotype.—Cat. No. 11960, U.S.N.M., and in Author's collection.

CHILO PURITELLUS, new species.

Expanse, 31–35 mm.

Head, palpi, thorax, fore wings above and hind wings above and beneath white, with a faint ochreous tinge. Upper side of abdomen lightly shaded with ochreous.

The fore wings are sparsely and microscopically dusted with whitish fuscous. Underside white, with a grayish hue.

One male and one female, Baboquivaria Mountains, Pima County, Arizona, July 15–30; Huachuca Mountains, Arizona, both from O. C. Poling.

Type.—In Author's collection.

This species may be a large race of *multipunctellus* Kearfott, but I am inclined to think it is distinct. Its large size is sufficient to separate it, at least until additional collecting in these regions turn up a series showing intermediate sizes.

Besides the above, I have six species of *Diatræa* and three of *Chilo* undescribed in my collections, but await longer series before making them known.

[a] Hampson, Proc. Zool. Soc. Lond., 1895, 946, places this species under *Platytes* Guenee (Argyria Hübner). As I have no specimens for examination of structure, I prefer to let it remain in this genus, according to Fernald's revision.

Mrs. A. Busck
Sept.

A NEW SPECIES OF JAPANESE MICRO-LEPIDOPTERA.

BY

W. D. KEARFOTT,

MONTCLAIR, N. J.

A NEW SPECIES OF JAPANESE MICRO-LEPIDOPTERA.

BY W. D. KEARFOTT, MONTCLAIR, N. J.

A pair of specimens of the species herewith described were sent to me by Dr. John B. Smith, the latter part of May, with the statement that they had been bred from larvæ found on young hemlock trees, recently imported from Japan by a nurseryman in this State. As the species was unknown to me and of a distinctly Oriental appearance, I sent a male to Dr. Edward Meyrick, Marlborough, England, the authority on Eastern Lepidoptera. Dr. Meyrick was good enough to make a prompt reply, stating that the species was undoubtedly referable to his genus *Ptochoryctis*, of which he has already described five others, all from Indian regions, and that the nearest allied genera, *Methathrinca* and *Linoclostis*, are also only known from India and the Malay Archipelago, hence he did not doubt that this species is truly Japanese. Dr. Meyrick also stated that the species nearest to it is *P. simbleuta* Meyr., the larvæ of which are brick-red, and feed beneath a web, covered with refuse and pieces of bark, on bark and shoots of tea-plants *(Thea)*, eating right through to the cambium, and thus killing the branch or plant. (Journal Bombay Natl. Hist. Soc., XVIII, 150, 1907.)

This letter was duly communicated to Dr. Smith, and he was good enough to forward fourteen other specimens, together with notes, larvæ, cocoons or cases and pupal shells, from all which the following description was made:

The larvæ were taken April 5th, in cocoons or larval-cases, larvæ all alive at this date, first pupa observed May 4th.

My belief is that the cocoons in which the larvæ pupated are larval-cases, making the habit similar to *P. simbleuta*. The case is of rather tough silk, thickly covered with pellets of dried frass, hemlock-needles and other refuse, lightly fastened to the twigs and apparently fairly well concealed in a cluster of needles. The cases are 10–15 mm. long, by 5–6 mm. in diameter. Pupal shell remains within the case when moth emerges.

As it is quite possible that other shipments of hemlock from Japan may be infested with this species, it might be well for State entomologists and nurserymen to be on the lookout for its appearance. The moth is

not unlike *Crambus elegans*, and of the general appearance of *Stenoma schlægeri* and some of the whitish *Ethmias*. If it can readily be controlled it would be a very interesting and handsome addition to our fauna.

Family XYLORYCTIDÆ.

Genus PTOCHORYCTIS Meyrick.

Trans. Ent. Soc. London, p. 19, 1894.

"Head with appressed scales, side-tufts loosely spreading; ocelli present; tongue developed. Antennæ ¾, in male bipectinated, towards apex simple, basal joint stout, without pecten. Labial palpi long, curved, ascending, with appressed scales, terminal joint shorter than second, acute. Maxillary palpi rudimentary. Posterior tibiæ clothed with long hairs.

Fore wings with vein 1b furcate, 2 from 4/5, 7 and 8 stalked, 7 to hind margin, 9 absent, 11 from beyond middle.

Hind wing 1, trapezoidal-ovate, hind margin sinuate, cilia ½, veins 3 and 4 short-stalked, 6 and 7 approximated towards base.

Nearly allied to *Cryptophasa*.

Type of genus and only species described in this paper, *P. eremopa* Meyrick.

Habitat.—Koni, Upper Burma."

Ptochoryctis tsugensis, new sp.—♂–♀. Expanse, 21–24 mm.

Head, thorax and labial palpi cream-white, latter dusted with fuscous at base; stalk of male antennæ cream-white, narrowly fuscous between joints; pectinations fuscous, basal joint shining greenish-fuscous; female shining fuscous, faintly annulated with white. Abdomen cream-white, posterior upper half of each male segment cupreous; legs cream-white, first pair heavily overlaid with shining fuscous, middle pair heavily dusted with fuscous on tibiæ and tarsi, posterior pair but lightly speckled, spurs all dusted, heaviest at apices.

Fore wing shining white, marked with fuscous as follows: Over upper vein of cell, from just beyond base to end of cell and continuing over vein 6 with branches 7 and 8, with a faint scattering of dark scales over 10 and 11. The lower vein of cell, from middle, is heavily overlaid with the dark colour, spreading over veins 2 to 5, the interspaces being more or less white. Vein 1b from beyond base to tornus. The extreme base of wing is pure white, except costa, narrowly edged with fuscous to inner ⅓. A dark subterminal line begins at outer sixth of costa, curves outward to vein 6, thence inward to tornus, paralleling margin, over each vein the colour is darker. Between this and cilia the terminal space is

overlaid with a lighter shade of cupreous-fuscous, forming a continuous terminal line, but inward interrupted by white spots between the veins. Cilia white at base, through which runs a fine dark line, outwardly lighter shining fuscous.

Hind wing whitish-yellow, cilia white, with faint median line ; under side fore wing shining light fuscous, slightly darker over veins ; hind wing yellowish-gray, slightly darker over veins 7 and 8.

Variation : Description is from average specimens ; the amount of dark scaling is not uniform, in some specimens the dusting is much heavier, nearly filling the interspaces, especially beyond and below cell, in others the dark scales are absent, except on the veins, but in all the pattern is maintained as per the description.

Described from 8 males and 8 females bred from larvæ on a Japanese species of hemlock, *Tsuga sieboldi*, at a nursery in New Jersey ; issued May 7 to 23. A pair of co-types deposited in U. S. Natl. Mus., N. J. Agric. Exp. Sta., Meyrick collection, the balance in Kearfott collection.

Larva full-grown, from alcoholic specimen.

Fourteen mm. long, 2.5 mm. diam. at 1st abdominal segment. Cylindrical, slightly tapering from 1st abd. to anal segment. Head blackish-brown, flattened in front, rather square on top ; clypeus triangular, reaching only half way to vertex ; epistoma paler ; antenna concolorous. Prothoracic shield large, concolorous with head, bisected by paler dorsal line, two tubercular plates below large and brown. Body cream-white, speckled with pink, the pink specks are in a double dorsal line, a subdorsal line, a subspiracular line and a line above the feet, also a less distinctly defined ventral line. The subdorsal line is darker and better defined than the others. Tubercles prominent, pinkish-brown. Setæ moderate, pale. Anal shield large, yellow, speckled lightly with pale brown. Thoracic feet blackish-brown, annulated with whitish ; abdominal feet moderate, normal, the crochets in complete ellipse.

Pupa, 8 x 2 mm., slightly flattened, light brown, darker on dorsum. Frontal shield similar to Tortricid pupa. Cremaster broad laterally, with two outer and two middle very short hooks.

Examples of this larvæ were submitted to Prof. W. T. M. Forbes, who has written description which will follow. In a letter, Mr. Forbes states :

"The caterpillar shows some curious likenesses to *Endrosis lacteella*, such as the form of the front and surrounding parts. There seems to be also a suggestion of the curious slit-like marks on the labium. On the other hand, the setæ on the prolegs are unique, so far as I have seen, and so is the double ring of tubercle iii. Can it use setæ iii in travelling, and so need a more complex joint for them than other caterpillars have ?"

Mailed October 7th, 1910.

been suspected. Since observing this instance, several similar, but not so clearly defined cases, have been noticed. Barber's observations on *Phengodes laticollis* (Proc. Wash. Ent. Soc., Vol. 7, pp. 196-197), also point strongly to the relation between luminosity and sexual function in that species.*

Both sexes of *pyralis* appear to be non-luminous during copulation, but flash if disturbed.

The phenomenon would be easier to understand if only the apterous or more sluggish females were brightly luminous, while the males, as in *Phengodes laticollis*, were non-luminous, or but slightly so. But in our two species most common here the male is either considerably brighter than the female or approximately equal to his mate in brilliancy. The luminosity of larvæ is also a little hard to comprehend, except as a developmental form of a rudimentary organ. Dubois has claimed that even the unfertilized eggs are luminous.

That the light has also a protective function is also readily surmised. I have heard of at least one *bona fide* instance, where the sudden flash of a fire-fly saved him from being made a portion of the evening meal of a chicken. Between the light which they give and the sticky exudation and unpleasant odour of most species, it seems hardly likely that they would prove a tempting morsel to insectivorous creatures. Toads, it is said, have been known to eat them.

There seems to have been some discussion, in times past, as to whether the light-emission of the various luminous forms was voluntary, or at least under the control of the organism. One argument that was advanced against the view that the phenomenon was under the control of the organism was that the light of the luminous tropical elaters, cucuyo, etc., was constant, and not intermittent. Anyone who studies the natural light-emission of the Lampyridæ can scarcely help but conclude that, except when they are subjected to some powerful excitement, such as mechanical, electrical or chemical stimuli external to the organism, the light-emission is entirely voluntary, and under the control of the will. Apparently the insects of the group Luciola emit a continuous twinkling, which has been stated to be synchronous with the respiratory movements of the abdomen, or with the circulatory impulses of the hemolymph ; such synchronism may exist, but it would hardly seem to be proof that the light-emission was not under the control of the insect's will. The cucuyo, indeed, has been observed to vary the intensity of its light apparently entirely at will.

*I regret that in this connection I have not yet been able to secure a recent paper by Meissner, "Wie leuchten die Lampyridæ?" in the Entomologische Wochenblatt, 1907, Vol. 24, [illegible].

LARVA OF *PTOCHORYCTIS TSUGENSIS* KEARFOTT.

BY W. T. M. FORBES, NEW BRUNSWICK, N. J.

Head and cervical shield heavily chitinized; anal plate less so. Tubercles broad. Granulations of fine sinuous lines of dots in the thinner portions, becoming polygonal patches of dots on the tubercles.

Head higher than wide, a little squarish at the top. Epicrania high, extending far above top of adfrontals and setæ i; i directly above ii and separated by only about 1/7 height of head (measured from lower edge of clypeus to vertex); ii distant from adfrontals; six ocelli, the posterior on a level with the lower anterior, but separated by a cleft extending up from the antennal membranous area. Lower ocellus at middle of posterior edge of the antennal area. Front only 1/5 height of head, about as high as wide, the setæ about a third way up and far apart; the punctures ¼ as far apart and much lower. Adfrontals broad, not extending far above top of front, with both margins evenly sinuous; i above top of front, and puncture much nearer to it than to ii. Clypeus large, with setæ far apart. Labrum slightly notched, ii higher than i, iii obliquely above iv; puncture between i and ii and higher. First free joint of maxillary palpus not as large as in *Cacœcia* (Ann. Ent. Soc. Am., III, pl. 20, fig. 137); sclerites of maxilla separate, the stripes more lightly chitinized, the subgalea sending a projection between the palpifer and base of palpus; cardo large. Submentum and mentum fused, the lines of separation indicated by two parallel longitudinal slits, between which there is a chitinized area. Setæ distant. Antennæ about as in *Simæthis* (loc. cit., fig. 140), but the first two joints are equal in diameter.

Cervical shield as wide as the segment, extending down to the spiracle; it may fuse shortly with the large prespiracular plate in front of it. Meso- and metathorax, with ia + ib, iia + iib; iv + v and on a level with iii. True legs moderate. On the abdomen, i and ii are on a level, distant; iii is a large ring, in the centre of which there is a small ring bearing the seta and a couple of projections; iv + v, iv minute, above and in front of v; vi single; vii consisting of an oblique row of five setæ and a sixth just behind the upper two. Prolegs not strongly projecting, with a complete ellipse of 50 hooks, alternately of ⅔-lengths. Anal prolegs with a bent bend of hooks, and also with extra setæ in the region corresponding to vii. On A1 and A2 vii is of 3 setæ; on A7 of two and on A8 and A9 of one only. On the ninth segment i and ii are obliquely placed, and ii are very far apart.

The outer ring of iii might be easily mistaken for a spiracle, and only occurs on the spiracle-bearing segments of the abdomen.

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